A McGRAW-HILL PUBLICATION

Chemical Week



Epoxy price cuts, expansions highlight versatile plastic's new growth surge . . . p. 31

Preventive maintenance plan saves manpower, cuts number of breakdowns . . . . . p. 41

Exports of chemicals drop 4% in first half of '58. Figures on 26 key commodities . . p. 49

Naphthalene price cut ahead? Rising imports, slack demand may force the cut . . . p. 59

Synthetic "putty" sales will hit $10 million in '58, may go up another 50% in '59 . . p. 67

September 13, 1958

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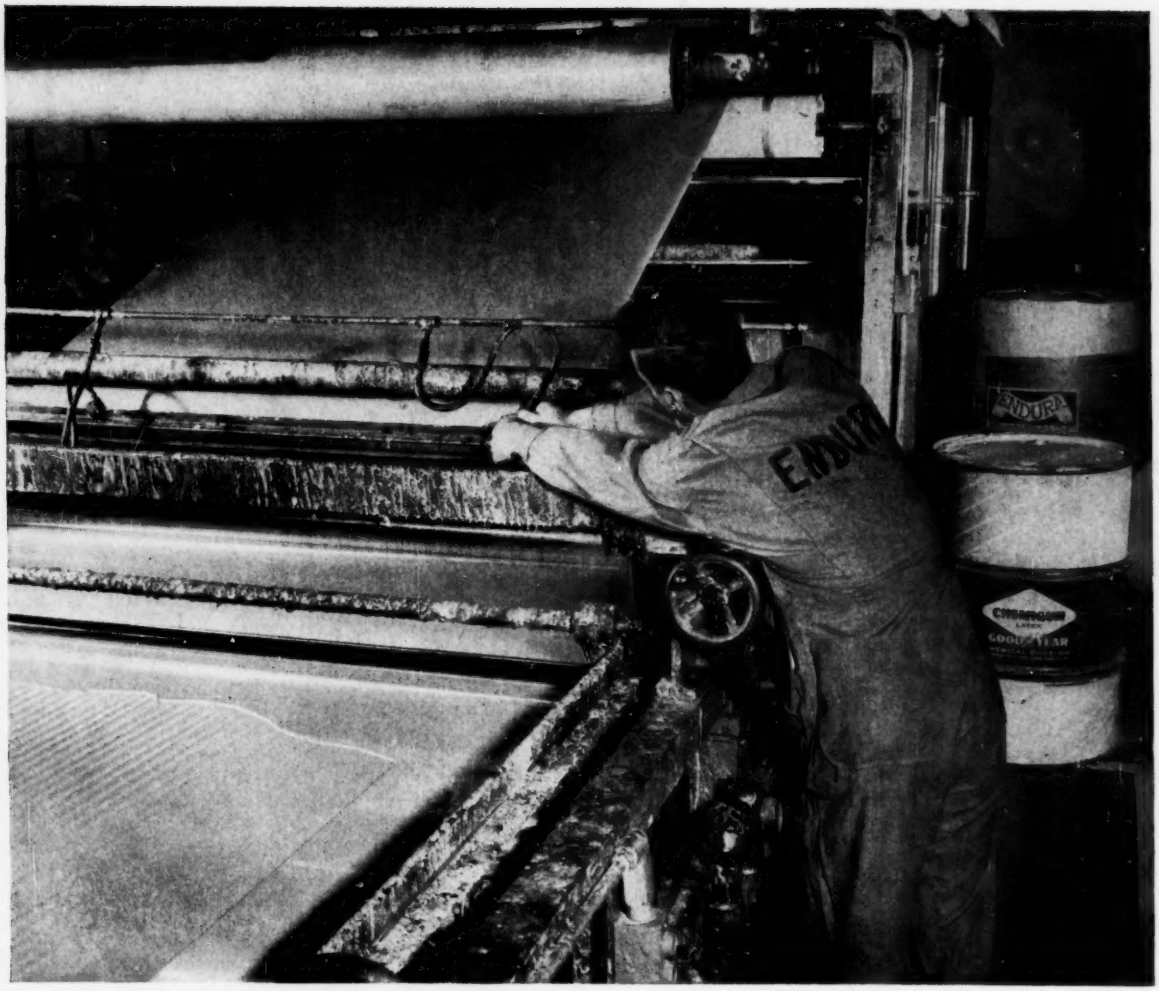


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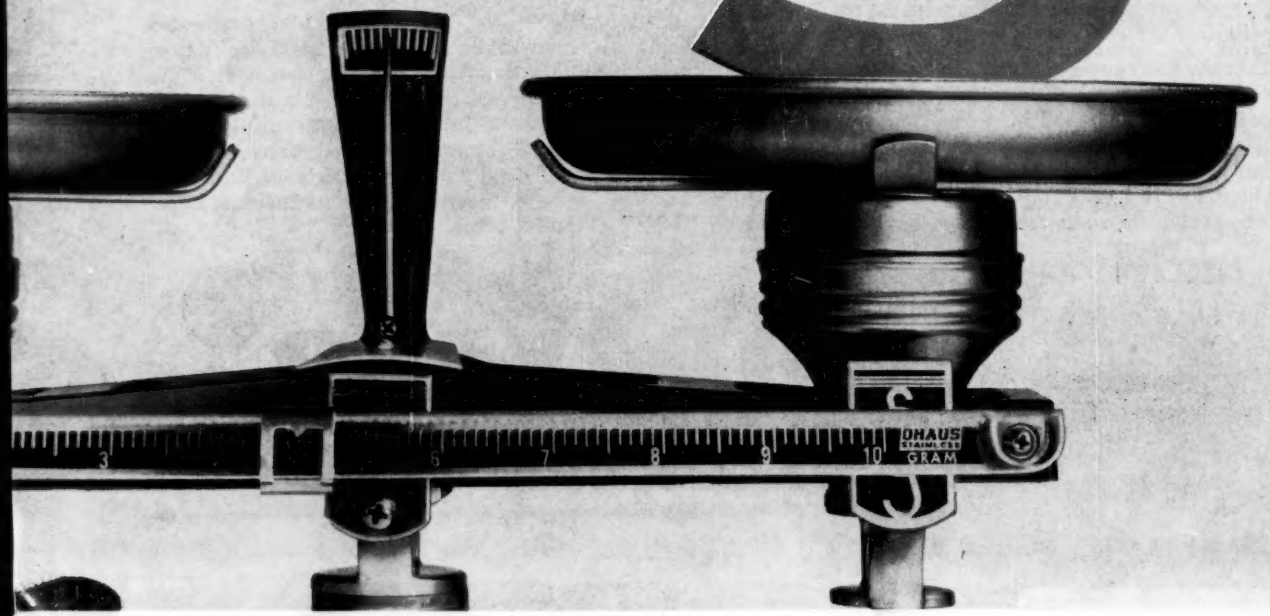
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Chemical Week

TOP OF THE WEEK SEPTEMBER 13, 1958

- **International Atoms-for-Peace show at Geneva** sheds new light on commercially useful nuclear processes .....**p. 34**
- **Wringing more oil from hard-to-tap reservoirs** is goal of new underground combustion processes .....**p. 79**
- **Retaining researchers past retirement age** has become policy at several chemical companies. Pros and cons .....**p. 89**
- **Olin Mathieson carries off community relations coup** in three-day sportsman's jamboree in Kentucky .....**p. 97**

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32 Solid rockets for moon-shoot? Aerojet-General's Geckler states the case for solids, says suitable device could be ready in a year.

32 Stauffer will boost its stake in defense-vital "chemical metals" by increasing its holdings in electron-beam refining process.

33 Eastman, claiming basic position in technology and material, is latest to join polypropylene parade.

33 Latest government figures on proposed expansions show CPI companies schedule $5.6 billion worth of new construction in '58.

34 Second international Atoms-for-Peace Conference at Geneva is new chance for industry to size up the atom's commercial prospects.

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Here's how to make preventive maintenance pay off in dollars and reduced down-time.

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52 Motor carriers okay lighter-gauge drum for use with many chemicals.

59 MARKETS
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67 SPECIALTIES
Building industry's trend to "curtain-wall" construction opens market for specialty sealants; $4 million worth will go into new buildings this year.

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Petroleum producers groom underground combustion process for higher oil recovery from hard-to-tap fields.

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Chemical companies are trying some new ideas to add useful years to careers of researchers.

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110 CHARTING BUSINESS
Sodium silicofluoride gets new growth stimulus as more cities adopt water fluoridation.

COVER ILLUSTRATION—UNION CARBIDE CORP.

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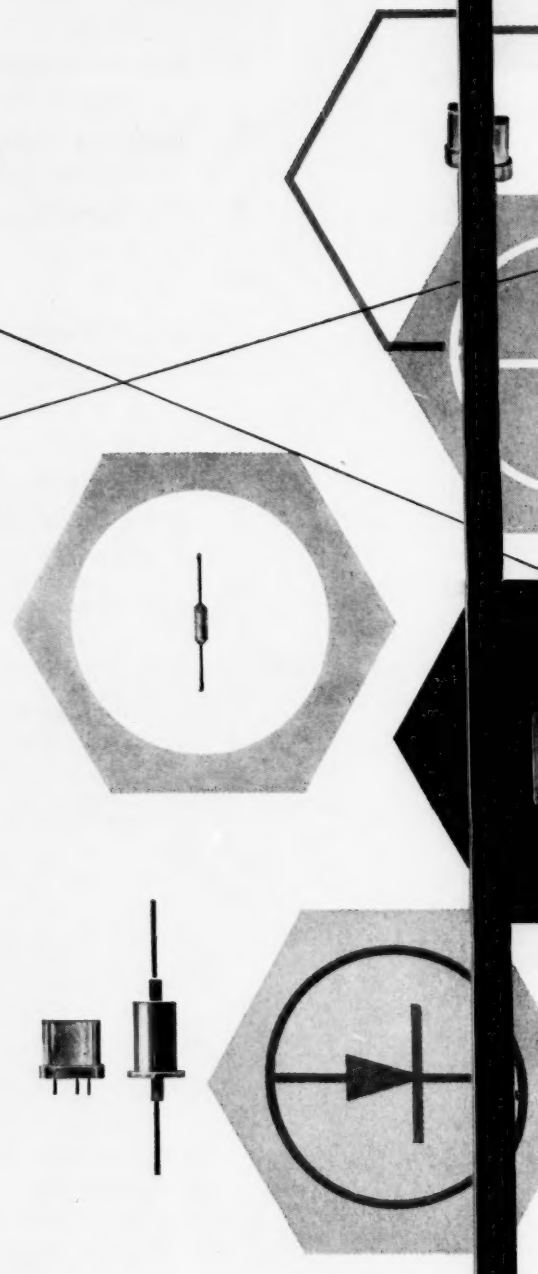
As Mr. Nugent writes in his letter opposite, "... the same uniformly high purity of Baker chemicals, lot after lot, has been very helpful in our operation. From such purity we get improved performance ... a higher percentage of acceptable transistors, and with lower costs. *The purity of Baker chemicals has been important to us in maintaining an aggressive position in a highly competitive industry.*"

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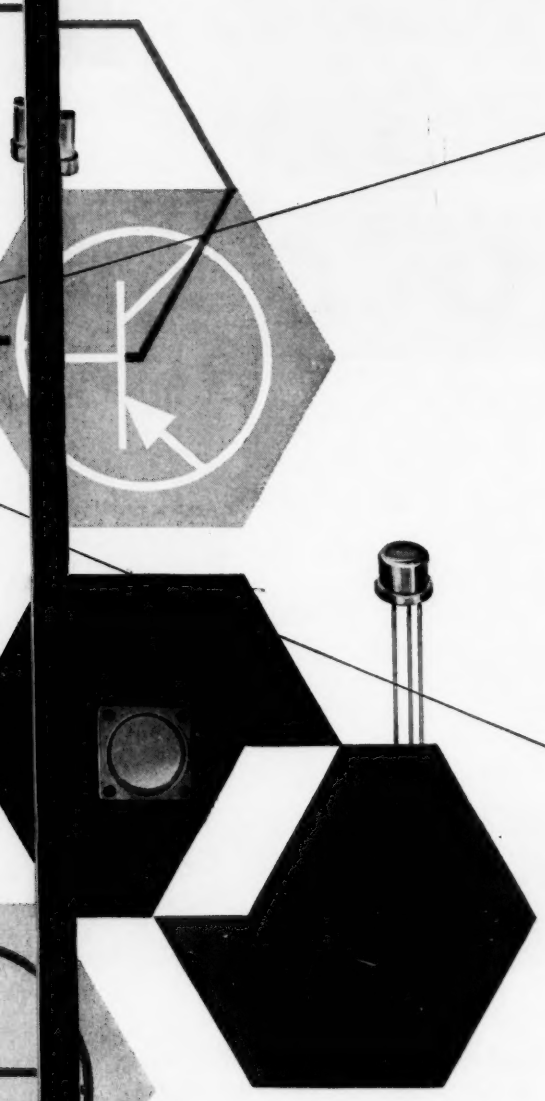
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January 16, 1958

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The purity of Baker chemicals has been important to us in maintaining an aggressive position in a highly competitive industry.

Sincerely yours,

Donald P. Nugent

Donald P. Nugent
Purchasing Agent
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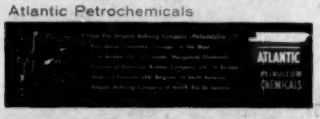
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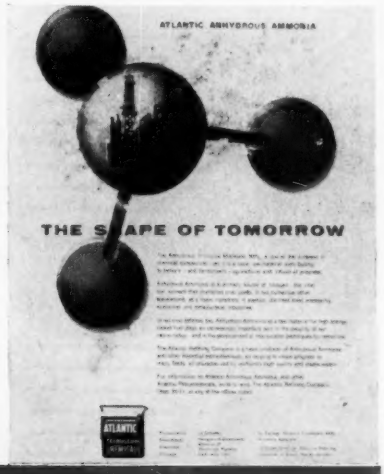
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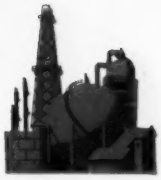




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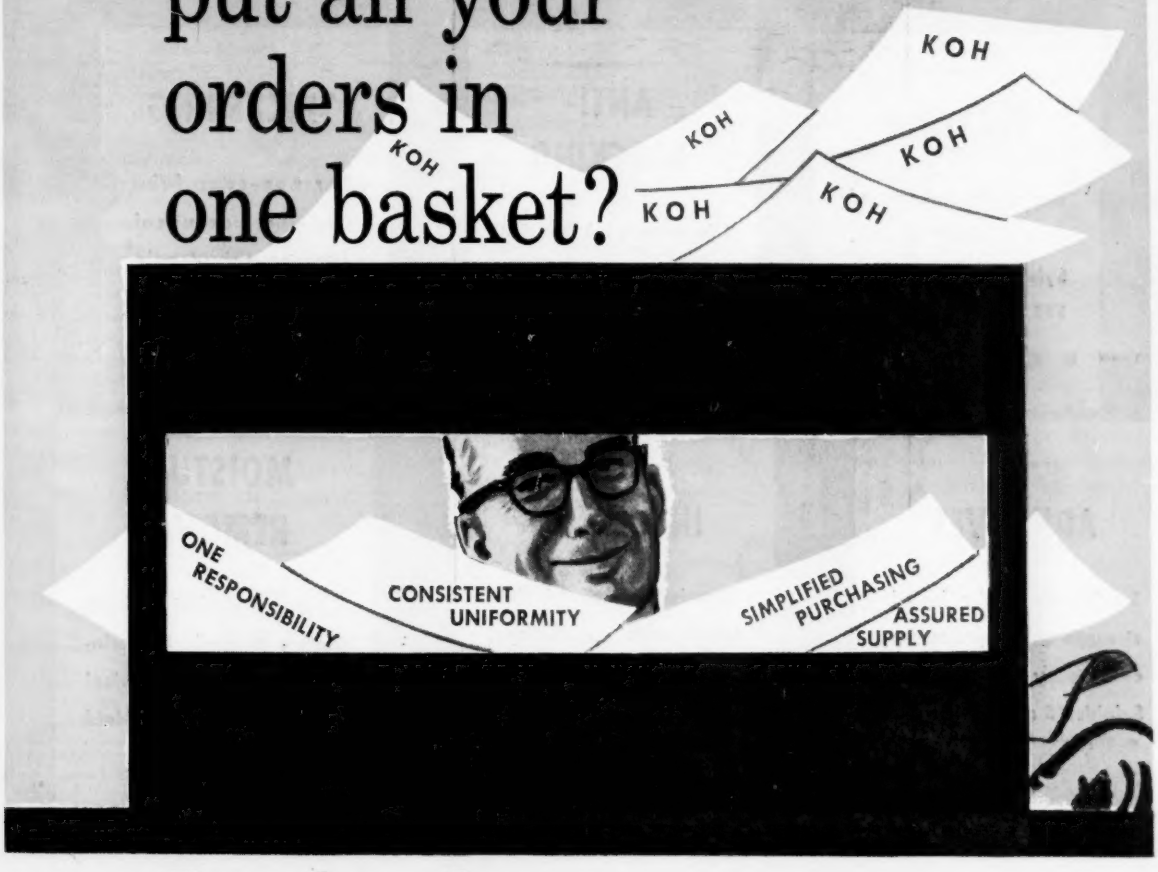
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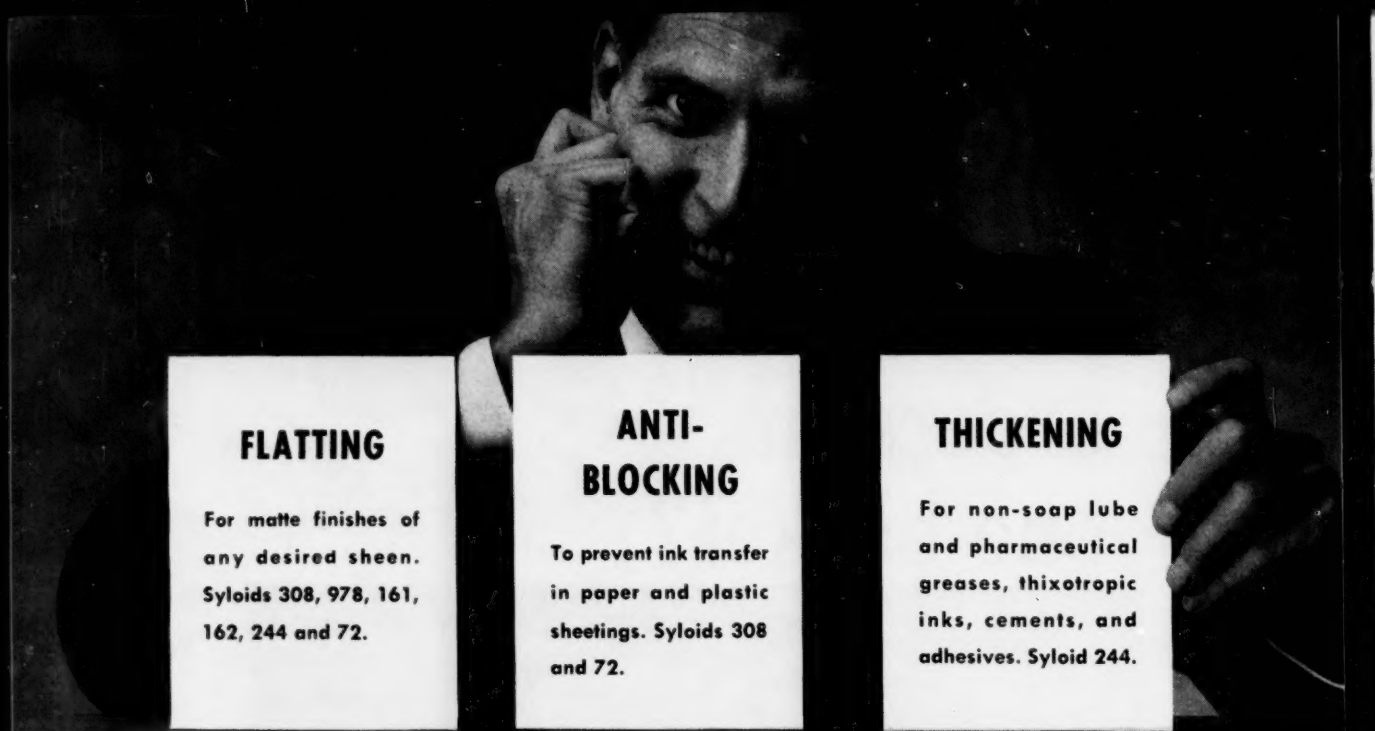
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THE BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

VIEWPOINT

OUR FAVORITE professional economist, McGraw-Hill Dept. of Economics' Dexter Keezer, says that the best way to put an audience to sleep is to start talking about depreciation. It is a ponderous, soporific subject. Nevertheless, depreciation policy is a weighty factor in determining capital expenditures for expansion and/or modernization.

Especially now must modernization be encouraged. First, it is in industry's self-interest to restore dwindling profits by increasing its productivity. More important, it's in the nation's interest—both to combat recession at home and to compete with technological advances abroad.

But does our present depreciation policy encourage this? Not nearly enough. Congress labored and brought forth a mouse—a complicated regulation that in essence provides 20% supplementary depreciation during the first year on equipment costing up to $10,000.

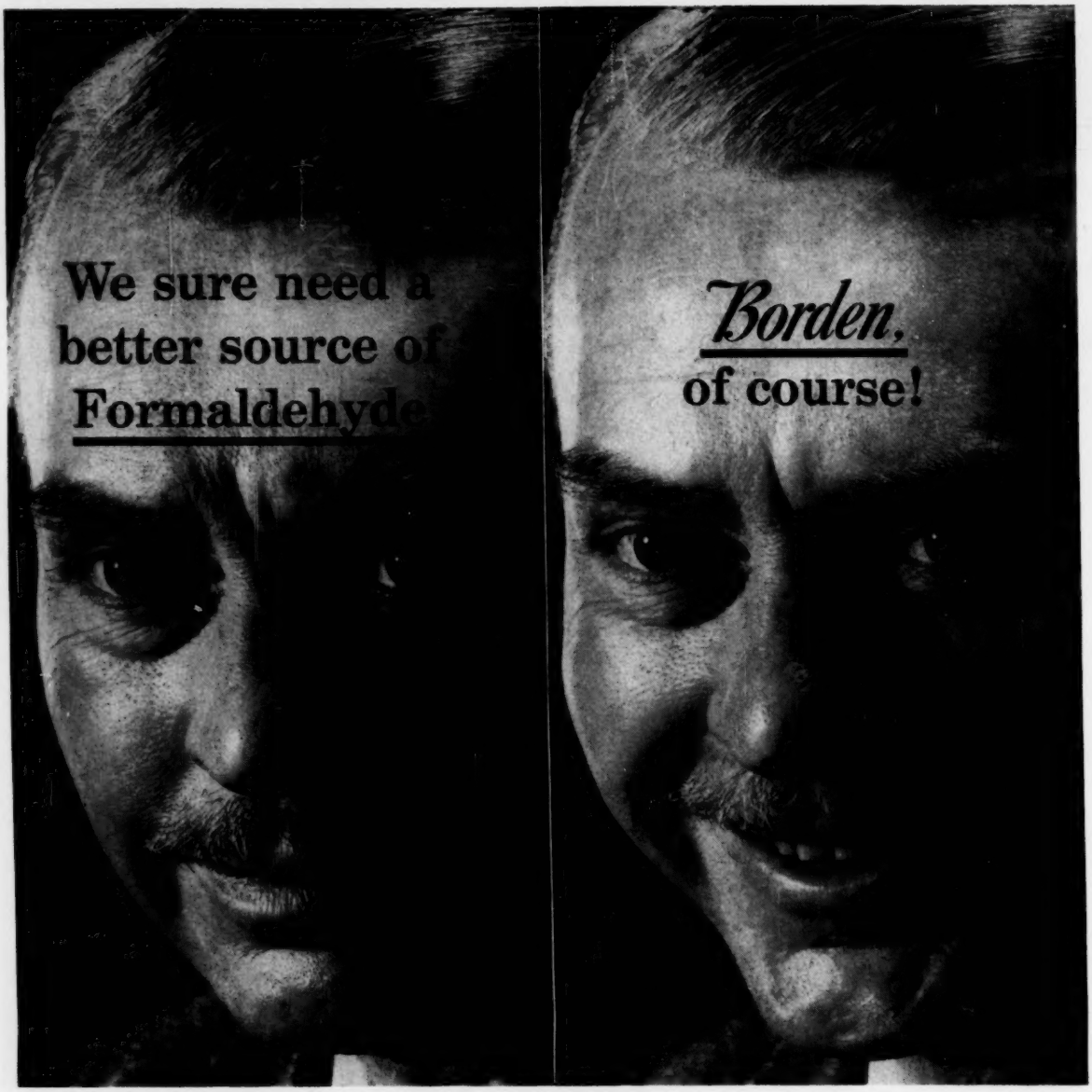
A bill introduced by Senator Capehart would have speeded depreciation on any capital equipment, would have provided a total tax saving of $600 million to $1 billion. Capehart contended—rightly, we think—that taxes on profits from the increased investment thus encouraged would have more than made up for the initial tax loss.

Our chemical competitors in Europe fare better. Whereas a U. S. manufacturer may have to wait 10-15 years to recover his expenditures, his Italian and French counterparts wait only seven years. The Swedish write-off period is five years; in Britain and Switzerland it's eight years; and although it's 10 years in West Germany, 60% can be charged off in the first two years.

It's obvious that the U. S. depreciation schedules play into the hands of our aggressive competitors.



Editor-in-Chief



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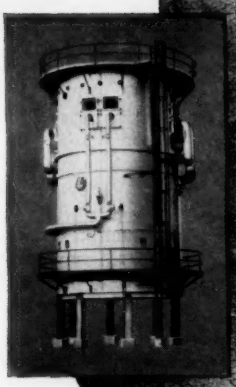
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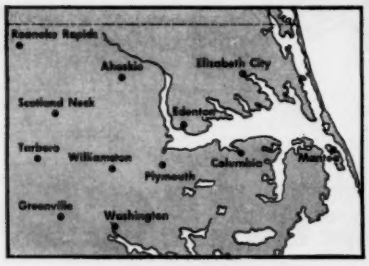
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pharmaceutical raw material
denaturant
chemical intermediate

n-butyraldehyde
chemical intermediate
plastic intermediate
pharmaceutical intermediate

isobutyraldehyde
pharmaceutical intermediate
resin raw material
chemical raw material

For samples and information about Eastman aldehydes and other Eastman industrial chemicals, call our nearest sales office or write to Eastman Chemical Products, Inc., Chemicals Division, Kingsport, Tennessee.

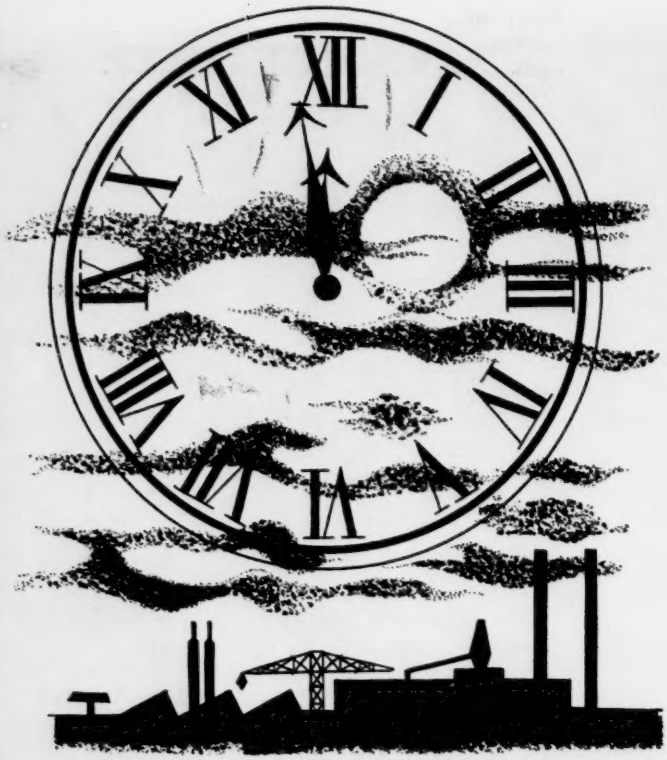


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SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; New York; Framingham, Mass.; Cincinnati; Cleveland; Chicago; St. Louis; Houston.
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The P.A. called the salesman. He'd gone fishing. But his home contacted the sales manager. The sales manager called the plant manager. "Meet me at the plant," he said. Together, they called a transport driver. Personally, they filled the transport and the order was delivered before dinner.

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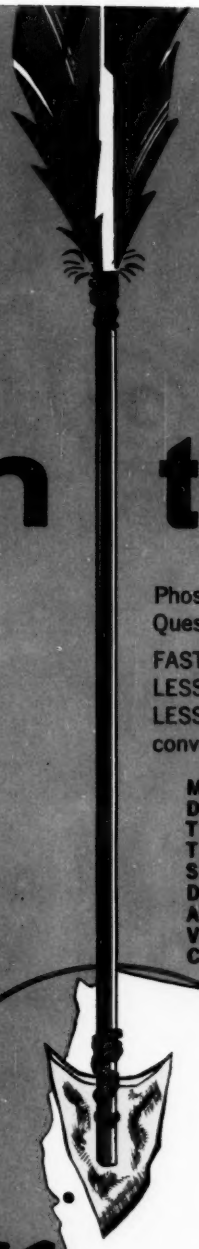
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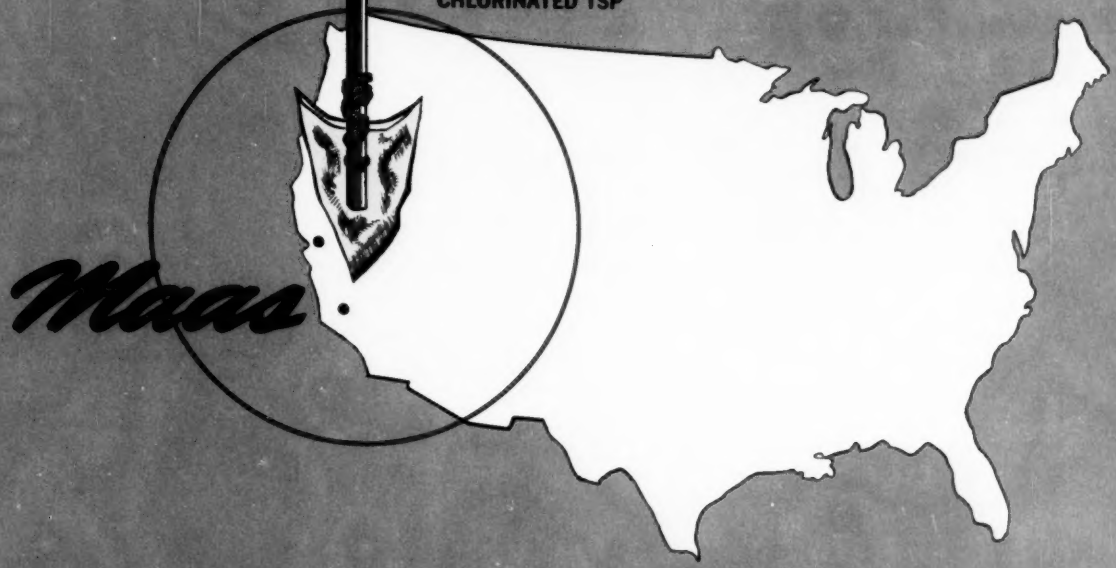


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- VITRAFOS (GLASSY)
- CHLORINATED TSP
- POTASSIUM PHOSPHATES
- PHOSPHORIC ACIDS
- SODIUM CARBONATE
- SODIUM HYPOSULFITE
- ANHYDROUS HYPO
- SODIUM SULFITE
- ACETIC ACID
- QUESTEX (EDTA)



A. R. MAAS CHEMICAL CO.
Division of Victor Chemical Works
General Offices: South Gate, California
Plants: Richmond and South Gate, California

Turn Page for Phosfacts—Poly

NUMBER 2 IN A SERIES

Pyro or Poly Which Phosphate to Use?

The ability of these phosphates to soften water, to hold metallic hardness ions in solution and to resolubilize precipitated hardness salts or sludge, make them useful in many applications. These unique properties may suggest new possibilities you will want to investigate.

SODIUM ACID PYROPHOSPHATE, ANHYDROUS ($Na_2H_2P_2O_7$)

Food grade acid pyro is the preferred acid phosphate for commercial baking powder, prepared cake mixes and doughnuts. Rate of reaction determines which of several types is best for a particular use. This acid salt is excellent for pH control in both food and industrial processes. Combined with wetting agents, a dilute solution of acid pyro makes an effective metal cleaner. The light phosphate coating produced on the metal surface by such cleansers provides a superior bond when paint is applied. Controlled pH and viscosity in drilling muds and clay slips without adding water is accomplished by adding carefully prescribed amounts of acid pyro.

TETRASODIUM PYROPHOSPHATE, ANHYDROUS ($Na_4P_2O_7$)

TSPP owes its utility to outstanding dispersant and peptizing properties. An efficient dispersant for calcium, copper and iron, TSPP has exceptional magnesium repression values. More stable in solution than other polyphosphates, TSPP is used in textile finishing, boiling out of cotton; in steam cleaning and other industrial cleaning compounds. Stabilization of hydrogen peroxide bleaches, fluidity control of clay slurries and builder for soaps and detergents are important functions of this versatile pyrophosphate.

ARMOFOS-SODIUM TRIPOLYPHOSPHATE, ANHYDROUS ($Na_5P_3O_{10}$)

Comparable to TSPP in actual cleaning power, this milder polyphosphate salt has about twice the calcium sequestering value and equal magnesium repression power. It will complex more readily with metallic ions and will remove such impurities from organic fibers. More stable in hot solutions than glassy phosphates, tripoly is almost as powerful a water conditioner. As a detergent builder, water softener, deflocculant or, in general, tripoly offers the best value of all the polyphosphates.

VITRAFOS (SODIUM POLYPHOSPHATE GLASS) (63-64% P_2O_5)

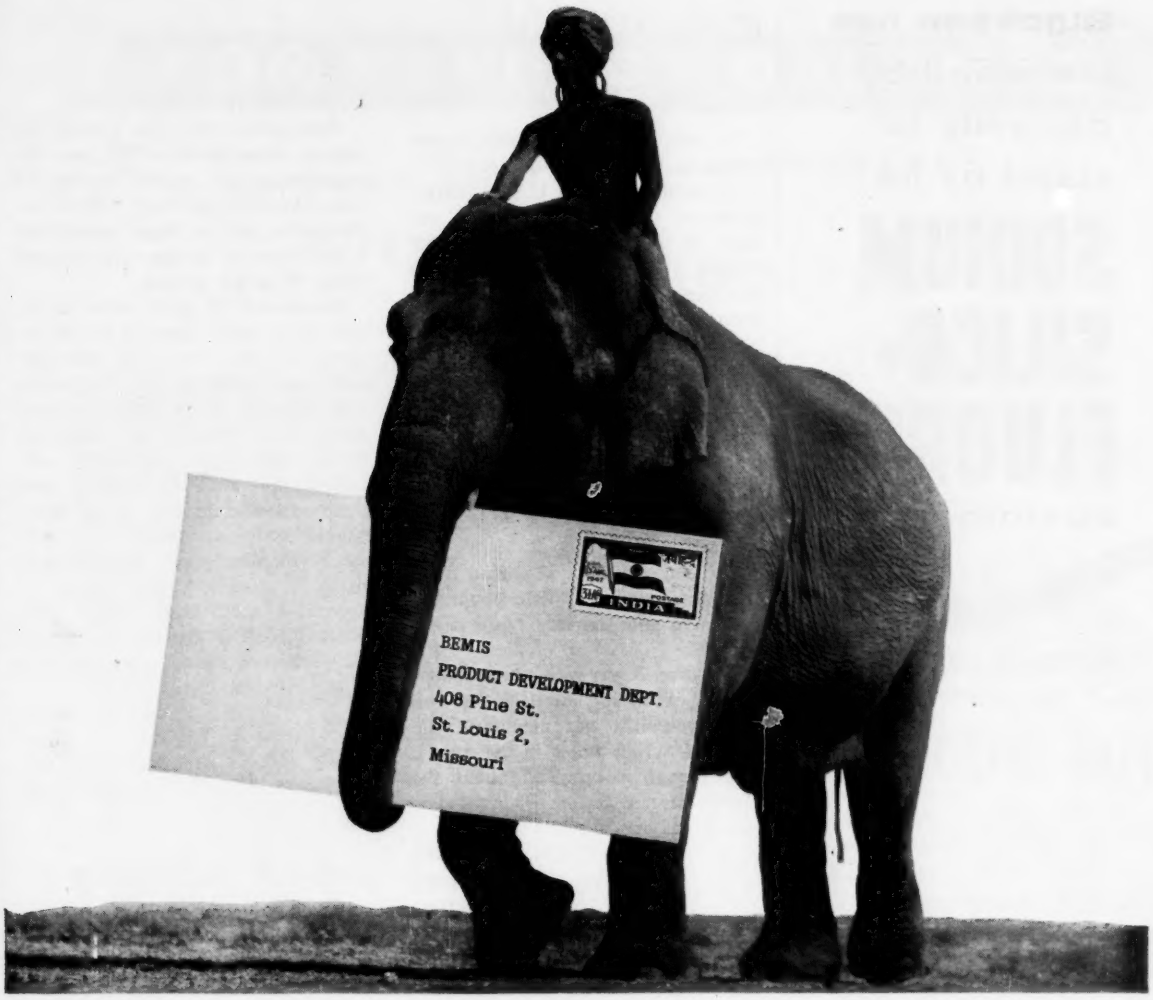
The molecularly dehydrated, or glassy polyphosphates are the most powerful water treating phosphates in general use. Higher cost is often offset by unusual calcium sequestering ability. Soluble complexes with both Ca and Mg are formed at lower concentrations than with other polyphosphates. Primarily used in water treatment, Vitrafos has applications in food processing and in certain types of cleaning compounds. Like other glasses, Vitrafos has no true chemical formula but consists of a varying network of P-O-P chains. These chains give Vitrafos many of its beneficial properties.

PROPERTIES OF SODIUM PYRO AND POLYPHOSPHATES (TYPICAL VALUES)

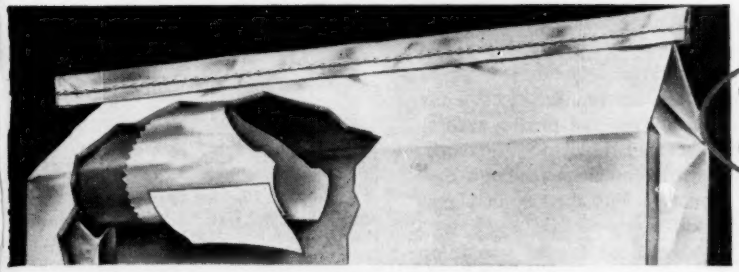
FORMULA	SAPP $Na_2H_2P_2O_7$	TSPP $Na_4P_2O_7$	STPP $Na_5P_3O_{10}$	VITRAFOS (Glass) 63-64% P_2O_5
Mol. Wt.	221.97	266.0	367.9	Glass network
TYPE	Powder Fine Gran.	Powder Gran.	Powder Gran.	Gran.
P_2O_5	63.0%	52.9%	57.7%	63-64%
Solubility Range Lbs./gal. water 20 C.	1.55 @ 40°C 1.00 @ 20°C	3.40 @ 80°C 0.35 @ 20°C	2.0 @ 90°C 1.20 @ 25°C	Greater than 12.0
pH of 1% soln. (Room Temp.)	4.2	10.2	9.7	7.8
Grades	Food Proc. Tech.	Food Proc. Tech.	Food Proc. Tech.	Tech.

Highly effective sequestrants, peptizers and deflocculants at normal temperatures, the pyro and polyphosphates revert to orthophosphates at elevated temperatures over widely varying periods of time. Sludging or precipitation can be prevented by further additions or by the adoption of a heat-time stable chelant. Should this be indicated, write for QUESTEX EDTA facts.

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Almost everybody who brings problems to Bemis (where flexible packaging ideas are born) likes the flexible solutions that Bemis creates out of 100-year experience, skill and just plain flexible imagination.



NEW! WON'T CLOG—CAN'T SIFT! The thoroughly tested "DUETTE" Sewn Multiwall Sleeve Valve is actually two-valves-in-one—*proved* siftproof, without packing trouble. The "magic yellow" flap is the secret. For dry chemicals, all grades of fertilizer. Get the *complete* "Duette" story. Address is shown on letter above.

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BEMIS BRO BAG CO.

Bemis may already be making the better package you need. Call, write, or ask your Bemis man.

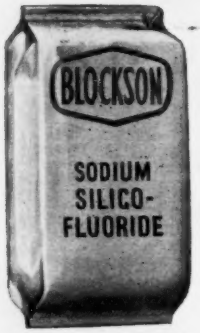
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SODIUM SILICO-FLUORIDE customers

with Blockson as your S S F supplier you can

PLAN AHEAD SAFELY

The largest Sodium Silicofluoride manufacturer, Blockson has stand-by capacity PLUS a plant expansion program that builds well ahead of its customers' increasing needs.



FOR DATA SHEET, TEST SAMPLE, PRICE OR CONTRACT PROPOSAL CALL BLOCKSON OR YOUR BLOCKSON DISTRIBUTOR

P.S. Include SSF with other Blockson chemicals in your mixed-car orders.

OLIN MATHIESON CHEMICAL CORPORATION
BLOCKSON

BLOCKSON CHEMICAL COMPANY
Division of Olin Mathieson Chemical Corporation
Joliet, Illinois

OPINION

In the Swim

TO THE EDITOR: Re your article on pool additives (*July 19, p. 69*):

In addition to the U.S. manufacturers of calcium hypochlorite, our firm, as exclusive sales agents for Nippon Soda Co. (Japan), sells this material on a nationwide basis, maintaining stocks in New York, Norfolk, Miami, New Orleans and San Francisco. Actually, we have been importing the product since 1933.

H. H. ROSENTHAL
President
Robeco Chemicals, Inc.
New York

TO THE EDITOR: We read with great interest your article about the swimming pool industry (*July 19, p. 69*).

However, it was with a tremendous feeling of disappointment that we noted you had not mentioned the name of Sylvan Pools in the article, even though you talked about the development at Scotch Plains that is putting in our pools . . .

MARVIN SHORE
Advertising Manager
Sylvan Pools Inc.
Bucks County, Pennsylvania

TO THE EDITOR: I read your excellent article in the July 19 issue on "Swimming Pool Additives." Your writer surely picked the meat of the swimming pool field, and this is difficult with such an extremely rapidly expanding field. Let me say "Amen" to your statement. "Tradenames mean little or nothing to most owners of private swimming pools."

It would be almost impossible for an "aggressive manufacturer of pool chemicals" to produce a complete line, considering the great diversity of items encountered. Therefore, the possibility of uniform pricing as outlined by you is rather remote. It depends more on the distributors learning the chemical business and pricing according to chemical distributor standards. There is a lot of chemical know-how that should go with the sale of chemicals to swimming pools.

The basic need in the swimming pool industry is for chemical engineers because the background knowledge of the chemistry of water is every bit as important as the engineering needed to build a pool.

You quote 80¢ per pound for calcium hypochlorite—70%, and this is correct for this material in 5-pound cans. However, anybody with a 20,000-gallon pool or larger should buy it in 100-pound drums with the cost being 34½¢ per pound.

Because of the great boom in this field, it is going through terrific internal changes from high cost specialty merchandise to more reasonable pricing based on the present volume market; and where a few major national distributors previously controlled the available market, now there are coming into being many sizable statewide distributors, with the consequent appearance of more basic producers from which to choose. It will still be several years before this field assumes the normal distribution channels, such as exist in other fields.

RUSSEL H. BEATIE
President
United Industries, Inc.
Wichita, Kan.

Forthright on Tariffs

TO THE EDITOR: I want to take occasion to compliment you on the Viewpoint editorial concerning tariffs and the chemical industry *(June 28)*.

Having followed this subject for a good many years, I think you have stated the case very well. This was also discussed with the chairman of our International Trade & Tariff Committee and we feel you have stated the position forthrightly.

FRANK H. CARMAN
Technical Director
Manufacturing Chemists' Assn., Inc.
Washington, D. C.

MEETINGS

American Chemical Society, 134th national meeting, Chicago, Sept. 7-12.

DCAT, 68th annual meeting, Sagamore Hotel, Lake George, N.Y., Sept. 11-14.

Society of Plastics Engineers, 4th annual regional technical conference; theme: plastics for the automotive industry; St. Clair River Inn and Country Club, St. Clair, Mich., Sept. 12-13.

American Institute of Chemical Engineers, national meeting, Utah Hotel, Salt Lake City, Sept. 22-24.

FOR PERFECT BALANCE

BETWEEN COST AND PERFORMANCE

emulsol-quality surface active agents

for DETERGENTS

. . . "built" cleaners, viscosity modifiers, foam stabilizers

EMCOL 5100 SERIES . . . fatty alkanolamine condensates

EMCOL P10-49 . . . an exceptionally water soluble alkyl aryl sulfonate . . . with excellent detergent properties.

FLASH FOAMING DETERGENTS

. . . for liquid bubble bath concentrates, shampoos, textile detergents.

EMCOL 4100 SERIES . . . sodium sulfosuccinate esters of fatty acid alkanolamides.

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EMCOL P10-59 . . . oil soluble amine salt of dodecylbenzene sulfonic acid.

EMCOL P-5900 . . . sulfonate base anionic-nonionic blend.

EMCOL H-50A . . . anionic-nonionic blend.

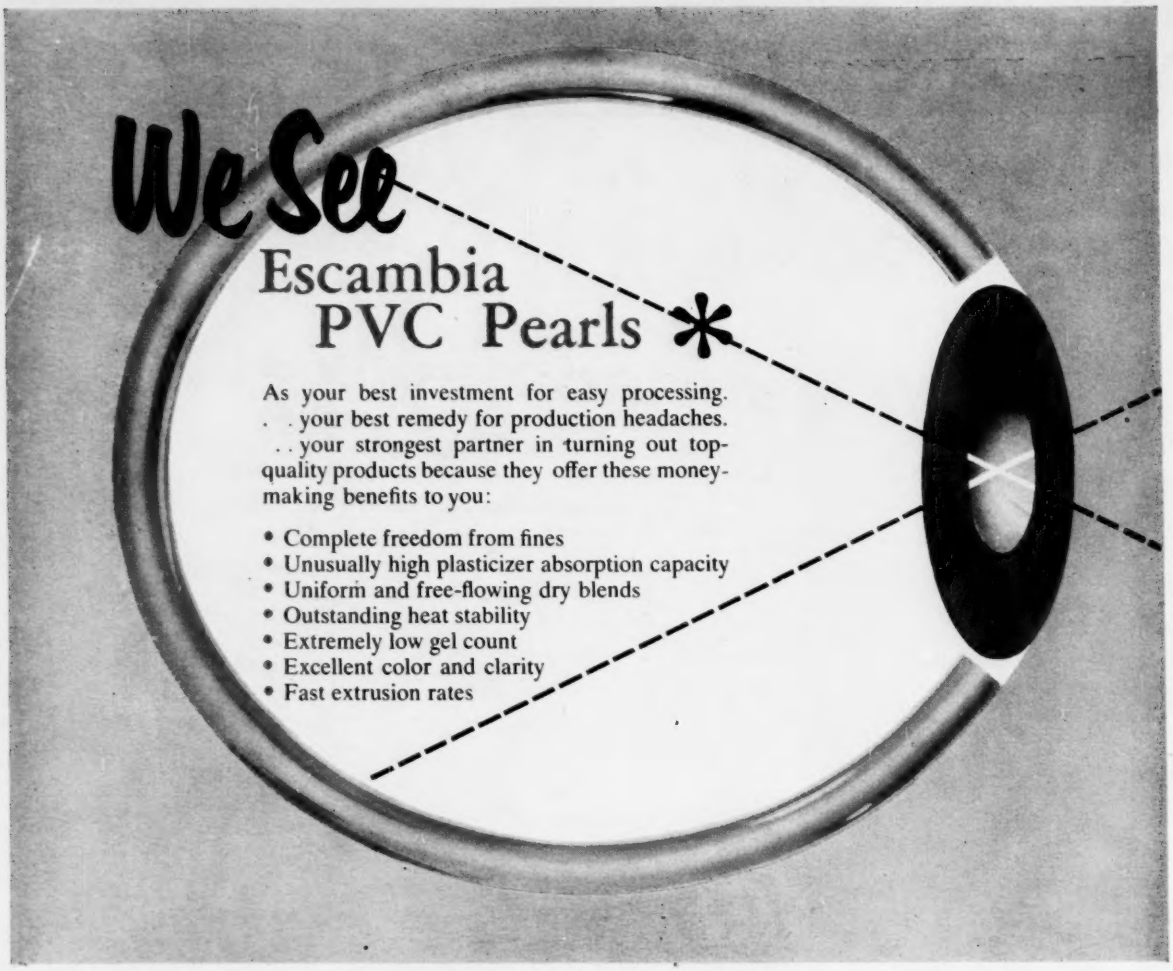
For complete information, write Dept. CW-9

EMULSOL

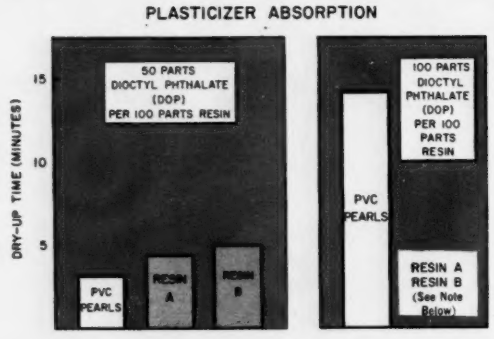
CHEMICAL CORPORATION

75 East Wacker Drive, Chicago 1, Illinois

division of WITCO CHEMICAL COMPANY, Inc.



HOW DO THEY LOOK TO YOU?



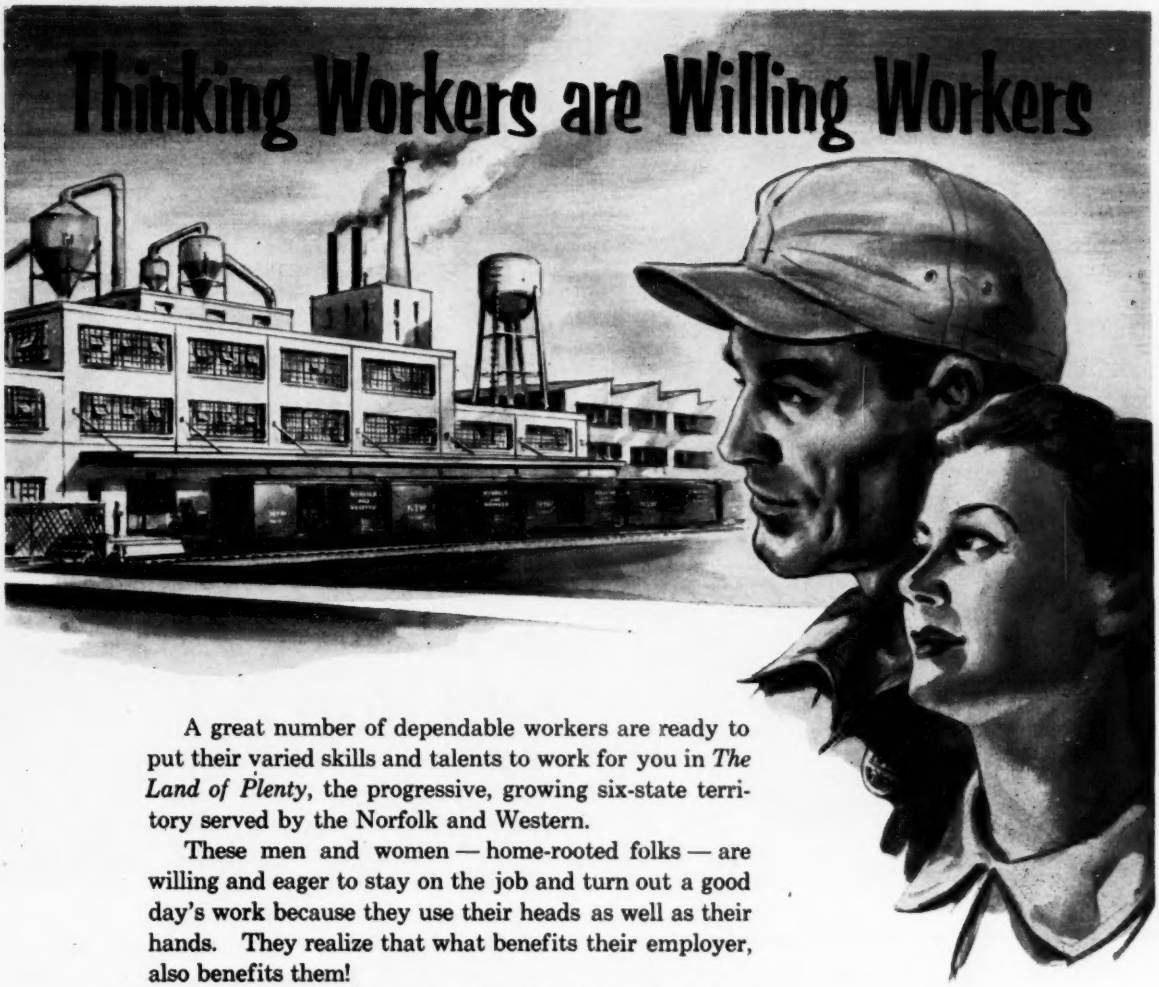
‡Conventional resins A and B could not absorb 100 parts of plasticizer and make a dry blend.

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*TRADEMARKS OF ESCAMBIA CHEMICAL CORPORATION

Thinking Workers are Willing Workers



A great number of dependable workers are ready to put their varied skills and talents to work for you in *The Land of Plenty*, the progressive, growing six-state territory served by the Norfolk and Western.

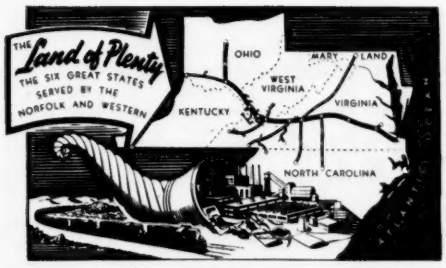
These men and women — home-rooted folks — are willing and eager to stay on the job and turn out a good day's work because they use their heads as well as their hands. They realize that what benefits their employer, also benefits them!

They demonstrate this attitude with a brand of loyalty and enthusiasm that enables them to meet high production goals and standards of quality. In other words, they believe in putting forth *extra* effort to maintain the things they just naturally cling to — their jobs, their homes, their families and the area in which they live.

These *willing and thinking* workers can help your new plant grow and prosper in *The Land of Plenty*. It's dependable manpower you can build on!

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L. E. Ward, Jr., Manager
Industrial and Agricultural Dept.
Drawer CW-805 (Phone DIamond 4-1451, Ext. 474)
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Roanoke, Virginia



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THE MAN WITH THE MULTIWALL PLAN



UNION
PACKAGING SPECIALIST
"WHITEY" CAMPBELL

shows packer how to pocket $85,000

$85,000! That's the *annual* dollar savings one user of Multiwall bags will enjoy as a result of a recent Union packaging survey.

The survey, made by Union Packaging Specialist "Whitey" Campbell, showed that: (1) $57,000 a year could be saved simply by switching the company's 3-ply domestic baler bags to 2-ply's. (2) reinforced sewing construction on 100-lb. packages would save 20# basis weight per bag . . . and additional thousands of dollars in costs depending on the number of bags used.

Union Multiwall Recommendations are based on this 5-Star Packaging Efficiency Plan

- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

These were the major recommendations made and put into effect through Union's 5-Star Packaging Efficiency Plan. Total savings are expected to amount to more than $85,000 when all improvements are completed. How much could this plan save you?

Better Multiwall performance through better planning

union camp

UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

UNION MULTIWALL BAGS

UNION BAG-CAMP PAPER CORPORATION
233 BROADWAY, NEW YORK 7, N. Y.



Continuing research has made LX-685 NEVILLE'S most versatile resin

In the few short years since it was introduced, Neville LX-685 has been employed with evident success in the preparation of an ever expanding group of products. A partial list of the uses for this versatile resin is on the right. If one of these applications is related to your product line, and you are not using LX-685, it might well pay you to write for literature or ask us for a sample. The Neville Technical Service Laboratory developed many of the present successful uses . . . perhaps it could help you too.

Present Applications:

Aluminum Paints, Brake Lining Compounds, Concrete Curing Compounds, Concrete Paints, Deck Enamels, Floor Paints, Gasket Stock—Oil Resistant, Gasoline and Grease-Proof Coatings, Gold Lacquers, Government Specification Coatings, Metal Coatings, Paper and Hardboard Impregnants, Pipe Coatings, Porch Enamels, Primers, Printing Inks, Shoe Soles—Cork Filled, Shoe Sole Compounds—GR-S, Slab Sole Stock, Traffic Paints

NEVILLE

Neville Chemical Company • Pittsburgh 25, Pa.

Please send information on LX-685.

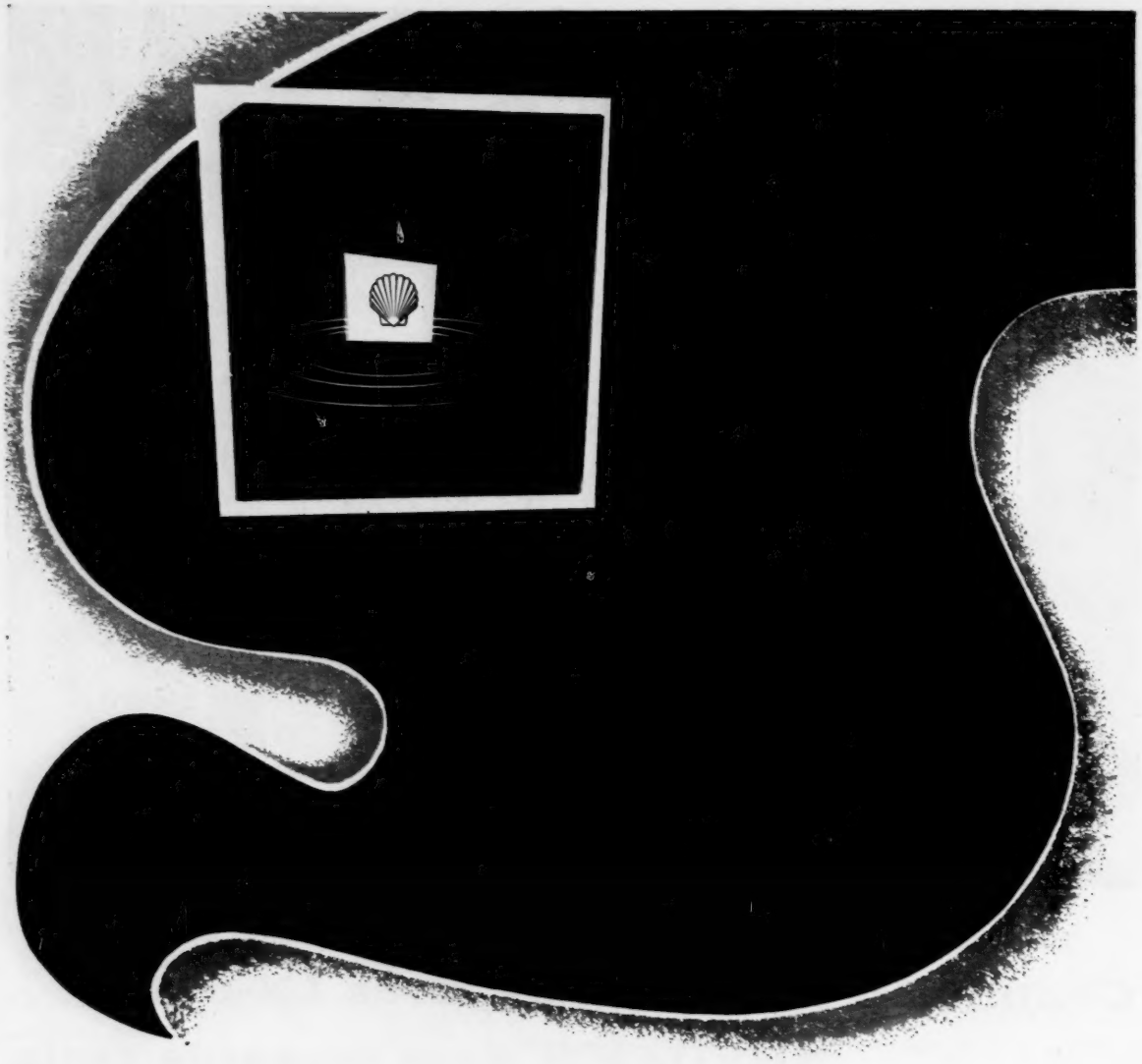
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Ethyl amyl ketone teams up with low-boiling MEK and medium-boiling MIBK to provide better flow and gloss and helps to eliminate dry overspray.

Also, EAK's slow evaporation rate helps minimize pinholing and bubbling in the film. It possesses superior blush resistance and good diluent tolerance.

EAK is also an important component of thinners for automotive, furniture and other lacquers. This high-boiler is also being used successfully in multi-color lacquers. Cellulose esters, vinyl polymers and virtually all synthetic and natural resins are soluble in EAK.

And, EAK is now proving itself as a valuable intermediate in several industries.

Your Shell Chemical representative will be glad to discuss your specific solvent needs with you. Write for ORGANIC CHEMICALS, a catalog of Shell solvents, resins and intermediates.

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SHELL

Business
Newsletter

CHEMICAL WEEK
September 13, 1958

A major expansion project is on tap for Du Pont of Canada. The company said last week that it will build two new plants, one at Sarnia, Ont., for linear polyethylene resin, and another at Whitby, near Toronto, to manufacture polyethylene film. Ethylene raw material for the new resin unit will come from Imperial Oil's petrochemical complex at Sarnia.

The firm also disclosed that it's expanding its Shawinigan, Que., unit for the manufacture of cellophane film in plain and polymer-coated (KST) forms.

•

The metals industry is beginning to show signs of a pickup.

Last week, Phelps Dodge Corp.—second-largest domestic copper producer—disclosed plans to immediately boost its output by 3,500 tons a month. The increase comes soon after Kennecott Copper's decision to hike output about 3,800 tons/month (*CW Business Newsletter, Aug. 30*).

Aluminum makers, too, are girding for an increase. Last week, Kaiser Aluminum & Chemical Corp. and Reynolds Metals reactivated potlines at Mead, Wash., and Jones Mills, Ark. Each will rehire about 150 workers. Reason: "An improvement in business conditions."

And 19 producers of lead and zinc, still suffering from recession slowdowns, will launch a joint research program to find new applications for the metals. Although producers say no substantial upturn has yet materialized for lead and zinc, they are confident the industry-wide research effort will contribute "in a major way" to future consumption. Chosen to head the program is Schrade Radtke, former director of Reynolds Metals' metallurgical research laboratories at Richmond, Va.

•

The slow drive for merger of AFL-CIO's two chemical unions may be picking up speed.

Details of the "progressive timetable" of merger preparations—drafted at Cleveland last month by top officers of both unions (*CW, Business Newsletter, Aug. 23*)—have been revealed following approval of the plan by International Chemical Workers' executive board and merger committee.

Next week, the plan will be considered by Oil, Chemical & Atomic Workers' executive board, and the following week by delegates to OCAW's annual convention, which will be held in Long Beach, Calif. Affirmative votes in those meetings and in ICWU's convention Oct. 6-10 in Washington would put the plan in action.

Essence of the agenda:

- Setting up a joint committee to draw up a proposed con-

stitution. This would be submitted to the two unions' merger committees at a meeting to be held between March 15 and May 15.

• Holding next year's conventions in the same city, at the same time. The merger could then be voted on quickly.

• Intensifying joint activities until the merger goes into effect. Stress would be on cooperation of company-wide councils, organization, and educational programs.

•

The two latest annual reports for the fiscal year ending June 30 show how the recession has variously affected different companies.

For Archer-Daniels-Midland, the slump ended in March. Nine-month (July-March) earnings slid 41% from the year before. But fourth-quarter (April-June) earnings shot up 71% over the previous fourth quarter, making it ADM's best final quarter since '54. Final score: sales, $215.8 million, down 1%; earnings, $3.9 million, down 25%.

For Virginia-Carolina Chemical Corp., the slump compounded long-term problems. Net income, after taxes and special charges, dropped 29%, the eighth decline in 10 years. Sales fell 4.3%. Totals: sales, $67.5 million; earnings, $665,244. On the brighter side, the company officers note that long-term debt was trimmed $1 million and that fertilizer and bag sales have picked up.

•

More changes in ownership of major chemical specialty companies are in the news following last week's merger of Drackett and Judson Dunaway (*CW Business Newsletter, Sept. 6*).

• Bon Ami Co. (New York) is now headed by Miami financier R. Paul Weesner, whose Commercial International Corp. recently bought 90,000 shares of Bon Ami Class B common stock from Baltic Investment Corp. (now Chemoil Industries). Weesner has appointed several new top officers, says he plans to make changes in production and marketing operations.

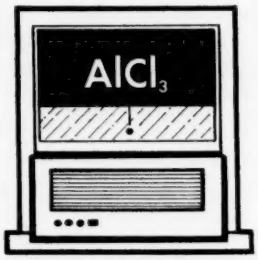
• Wall Street and the trade assert that B. T. Babbitt (New York) may merge with The Beacon Co. (Boston). But who would be acquiring whom?

Babbitt President Lachner told securities analysts his company is "seriously considering" two merger possibilities. Wax, along with detergents, would be a logical diversification, observers point out. Beacon wax is selling well—through the same outlets used by Babbitt. Babbitt says only that an independent party might have approached both firms.

Beacon says: "We are not interested in being acquired . . . we are interested in purchasing firms whose long-term growth possibilities are attractive." Babbitt, a Beacon spokesman says, could be one of them, but has not been directly approached.

BRIEFS

on a way you might save money on caustic soda... why we air-condition aluminum chloride... three hypophosphites... a new bulletin on Hooker chemicals



Why we air-condition aluminum chloride

Ever notice how aluminum chloride lumps up in humid or rainy weather?

It's because this is a thirsty chemical, drinking water right out of the air. Trouble is that it loses a lot of its value as a catalyst and reactant when it's wet.

There was a time when we didn't even *try* to make aluminum chloride on humid days.

But now we've put air-conditioning in, and we can make it all year 'round —assuring you a uniform, full-strength product, come rain or come shine.

You can get it in any of these four sizes:

1. Extra fine—90% to 95% through 40 mesh.
2. Fine unscreened—almost all through 20 mesh.
3. Coarse unscreened—through 1 mesh, 25% to 35% through 20 mesh.
4. Coarse screened—through 1 mesh, on 20 mesh.

For technical data, just check coupon.

Maybe you can save money on liquid caustic soda

If, like most of us, you're tightening budget belts this year, this nomograph ought to be of interest to you.

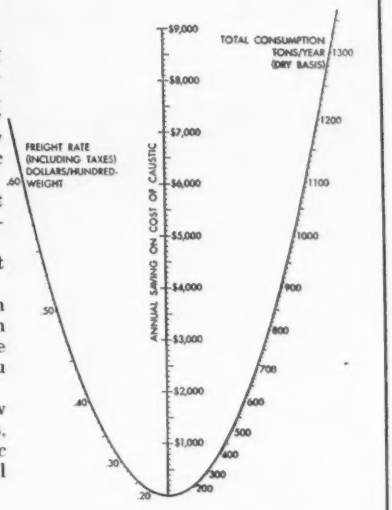
It can help you find out quickly if any substantial savings will follow a switch from 50% liquid caustic soda to 73%.

Draw a line from your current freight rate to your estimated annual consumption.

Any savings will show at the point where you cross the center line.

Of course, you'll have to figure in an annual depreciation on dilution equipment. We'll be glad to advise you on what you need, and how you might save money here, too.

For more facts like these on how to pare your caustic soda costs, check the coupon for our *Caustic Soda Buyer's Guide*. Better yet, call the nearest Hooker Sales office.



Did you know you can get *three* different hypophosphites?

You get your choice of *calcium, potassium,* and *sodium* when you order Oldbury® hypophosphites.

All three are N.F. Grade materials with the sodium salt also in a commercial grade, and are available in any quantity you need. They are all white crystalline compounds with no odor.

Calcium hypophosphite forms soluble salts and presents a good means of holding phosphorus in solution. It's typically 99% $Ca(H_2PO_2)_2$.

Potassium hypophosphite assays 99% KH_2PO_2.

Sodium hypophosphite is a strong reducing agent and antioxidant. The N.F. Grade assays 98% Min. $NaH_2PO_2.H_2O$. The Commercial Grade assays 84% Min. NaH_2PO_2. (Equivalent to 101% $NaH_2PO_2.H_2O$).

For more information on any or all of these compounds, send the coupon.

New bulletin lists chemicals, useful data

To bring our fast-growing list of chemicals up-to-date, we've prepared a new General Products List.

Its 12 pages give you a quick reference guide to all our chemicals and services.

With each product is a condensed listing of important specifications along with information on shipping containers.

For a copy, just check the coupon for Bulletin 100-B.



For more information, check here and mail with your name, title, company and address.

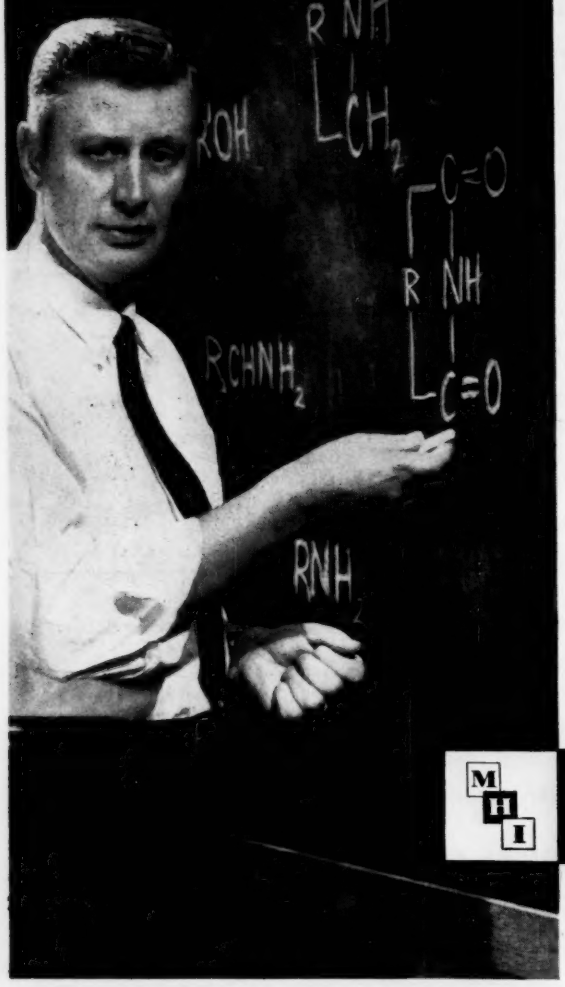
- ☐ Caustic Soda Buyer's Guide
- ☐ Aluminum Chloride
- ☐ Calcium Hypophosphite, N.F.
- ☐ General Products List
- ☐ Potassium Hypophosphite, N.F.
- ☐ Sodium Hypophosphite, N.F.
- ☐ Sodium Hypophosphite, Comm.
- ☐ Bulletin 100-B

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HOOKER CHEMICALS PLASTICS

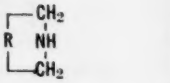
NOW, MHI LITHIUM ALUMINUM HYDRIDE FOR NITROGEN GROUP REDUCTIONS!



a new application development offering many important advantages

Of major interest, LAH will reduce these groups in *standard equipment* at room temperature and at atmospheric pressure. This cuts costly setups by eliminating the need for high-pressure hydrogenation equipment. Secondly, LAH provides bigger, more profitable product yields. A powerful, as well as versatile agent, LAH reductions are fast. Equally important, LAH is easy and safe to handle using standard techniques.

The following are typical of many nitrogen-group reductions which can be carried out successfully with LAH:

FUNCTIONAL GROUP	FORMULA	PRODUCT	FORMULA
Imide		Amine	

The reduction of imides to cyclic amines is analagous to that of amides and lactams consuming a total of one mole of LAH per mole of imide for the reduction of two carbonyl groups to methylenes.

Carbamate	$RNHCOOR'$	Amine + Alcohol	$RNHCH_3 + R'OH$

Carbamic esters undergo reduction cleavage to produce mixtures of N-methylamines and alcohols.

Oxime	$R_2C=NOH$	Amine	R_2CHNH_2

The reduction of oximes forms the primary amines, in general, free from by-products. However, it is frequently necessary to employ forcing conditions to increase the rate of reduction.

Hydroxylamine	$RNHOH$	Amine	RNH_2

Mono and di-N-substituted hydroxylamines react with LAH to furnish primary and secondary amines, respectively. The oxygen atom in tri-substituted amineoxides is eliminated by the hydride and tertiary amines are obtained.

Azide	RN_3	Amine	RNH_2

The reduction of aliphatic and aromatic azides yields primary amines.

The best solvent for LAH nitrogen-group reductions is tetrahydrofuran.

TECHNICAL BULLETIN AVAILABLE. A copy will be sent to you immediately upon request. There is no obligation, of course.

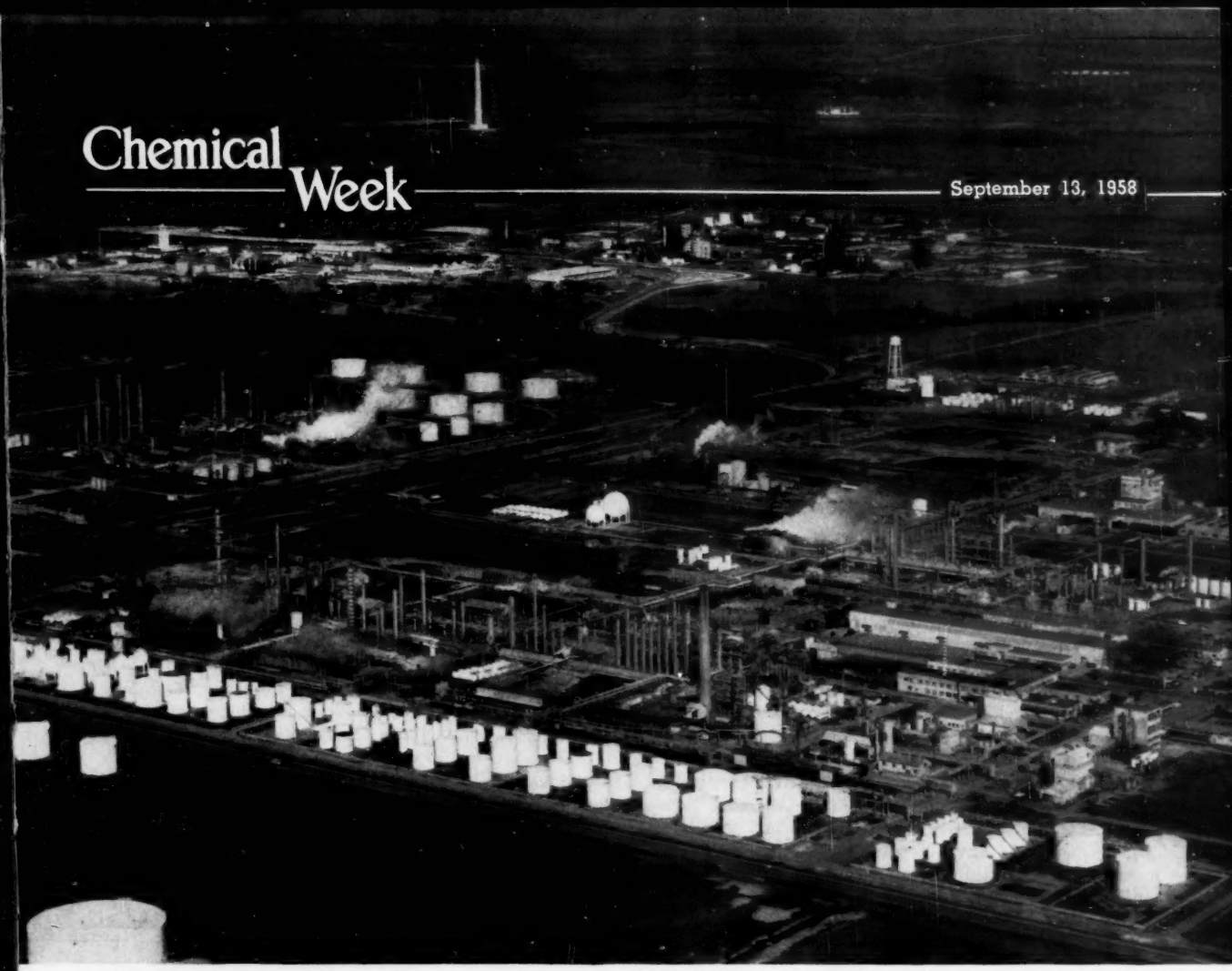
PIONEERS IN HYDROGEN COMPOUNDS

M H I

Metal Hydrides Incorporated

913 CONGRESS ST., BEVERLY, MASS.

Chemical Week — September 13, 1958



Shell's Houston chemical complex boasts the world's largest epoxy production facilities.

Epoxy Makers Seek Their Second Wind

Producers of epoxy resins are well advanced this week in their efforts to put sales of these versatile plastics back on the steep-climbing track that led through a nearly eightfold increase within five years, 1951-56.

Here are some reasons why epoxies may be due for another spurt:

- Recent price cuts—around 10% on solid resins and about 20% on liquids—by major producers (*CW Market Newsletter, Aug. 30*).
- Continuing growth of various epoxy-consuming industries — e.g., paints and finishes, adhesives, aircraft, automotive—and progress in development and testing of epoxies in such newer applications as oil field pipelines and highway coatings.
- Development of numerous promising new epoxies, such as resins based on Carbide's Epoxide 201.
- Prospects of further price reductions after new producing units come onstream next year.

Replotted Dreams: The rapid growth rate of epoxy resins during the early 1950s led some market specialists to make predictions that now seem like pipe dreams. One '53 forecast spotted '56 production at 60 million lbs.; it turned out to be only 36 million. As late as '55, the 60-million-lbs./year was still being projected, this time for '60. But that's a feat that very few would hope for now—output in '57 was 40 million lbs.

Industry executives don't expect the recent price cuts in themselves to cause any sharp upturn in epoxy sales. But they look for the reductions to encourage another look at epoxies by prospective consumers who use cheaper materials. As Shell Chemical's George Huldrum, Jr., puts it:

"We think the reductions will lead to greater consumption in fields where the resins are now being used, such as surface coating, electrical potting and plastic tooling. The lower prices also will open up new end-uses—plastic pipe, boats, tanks, auto parts, electrical and air-frame laminates, solventless coating systems—where previously the advantages of Epon resins over other materials were outweighed by price."

Few Basic Producers: Shell—whose principal epoxy plant (*photo, above*) is near Houston, Tex.—is the biggest U.S. producer of conventional epoxy resins and also of the main raw materials, bisphenol A and epichlorohydrin. With affiliate companies' plants in the Netherlands, England and Germany, the Royal Dutch-Shell group

is the world's largest epoxy maker.

Second largest in epoxies is Ciba. Its present U.S. production is at Kimberton, Pa.; but a new and larger unit is expected to be onstream early next year at Toms River, N.J. Epoxy production at Kimberton will then be discontinued.

Devoe & Raynolds—now a division of Merritt-Chapman & Scott—has concentrated mainly on solid epoxies, which go chiefly into surface coatings. D & R expanded its epoxy capacity 320% from '52 to '57 and completed another enlargement at Louisville, Ky., last spring.

Looming Larger: Dow Chemical, long a major producer of epoxy components, this year began making a line of liquid and solid resins at Freeport, Tex. The firm is now talking about combinations of epoxy resins with its Pelaspan, polystyrene in the form of heat-expandable beads.

Union Carbide's Bakelite Division has been producing epoxies on a relatively modest scale at Bound Brook, N.J., but early next year will start up a 15-million-lbs./year plant at Marietta, O. Despite the leveling-off in epoxy sales in the past few years, Bakelite is confident that markets in reinforced pipe and laminated structures will broaden.

Epoxide Fillip: But what may bring the biggest fillip of all to future epoxy sales is a whole new series of epoxy resins, based on complex epoxides that will be marketed from Union Carbide Chemicals' plant at Institute, W. Va., next summer. These epoxides will react to form resins that Carbide says will not necessarily be competitive with conventional epoxies. One type is likely to be used in combination with the older epoxies. The new products—expected to have a high degree of color stability and high heat-distortion points—will go into industrial finishes, tooling compounds, adhesives and other applications.

Solids Aim at Moon

The U. S. could launch a successful moon-shot using existing solid-fuel rockets. That's the contention of Richard Geckler, vice-president in charge of Aerojet-General Corp.'s solid rocket plant, in an exclusive CW interview last week.

"We could have an all-solid moon rocket, using existing rockets, in about a year's time," he emphasizes.

Geckler is, of course, not the first expert to claim that solid-fuel rockets can reach the moon. As far back as September, '55, Thiokol's Harold W. Ritchey, vice-president and research director, stated that a simple, solid-fueled rocket built at "modest expense" could hit the moon.

But Geckler's comments today, coming on the heels of the failure of the first U. S. moon-shot (which was caused by misfire of the liquid-fueled first stage), and a few weeks before the second try with a similar rocket, are bound to renew the controversy in the long-standing solid-vs.-liquid propellent feud.

Discussing the moon-shot fizzle, Geckler says it is now feasible to consider substituting a solid engine for the first stage. He bases this optimism, he says, on classified evidence collected from development work on the Polaris and Minute Man projects, and on data available on all other solid propellent missiles.

He points out that solid-fueled rockets have been getting steadily bigger, and that larger rockets mean higher performance. "Solid-propellent rockets," he believes, "are now available for all kinds of exploratory space missions." But before attempting a moon-shot, he cautions, time should be allowed for sufficient design work.

A year would be sufficient, he feels. But actual development time would, of course, depend on the priority given the project. Why were the solids passed over for the early stages of satellite launching rockets? Geckler admits that solid-fuels technology has lagged behind the development of liquid fuels. The metal in solid-fuel engines has been too heavy; the propellent's specific impulse, too low; the rockets, too small.

"Now," he says, "technology has advanced to the point where we can make larger rockets do the bigger job. The solid power plants have the advantages of simplicity and higher reliability. They're not as temperamental as the liquids, they're easier to handle. And there are so many fewer components that have to be checked out."

Geckler acknowledges that the reliability of liquids will improve in further stages of development. But he urges that "full consideration be given for research and development of all-solid-propellent space vehicles."

Bigger Metals Stake

Stauffer Chemical Co. is doubling its interest in the electron-beam melting process for refining high-temperature metals that it worked out in conjunction with Temescal Metallurgical Corp. (Richmond, Calif.) and Mallory-Sharon Metals Corp. Stauffer hopes to acquire Mallory-Sharon's one-third share in the project by the end of this month.

The three firms in the venture, which was never given a corporate name, disclosed the process early this year *(CW Technology Newsletter, April 5)*. Their plant has since been commercially producing small ingots of high-purity columbium *(CW, Feb. 1, p. 48)* and beryllium and experimental quantities of other metals such as tantalum, molybdenum and vanadium. (Destination of the beryllium is top-secret. One clue: electron-beam products are being used in the Navy's Polaris ballistic missile.)

In its present stage of development, Stauffer says, the small size of the ingot makes the process economical only for the higher-value metals. Future development will probably aim at scaling up the furnace size.

Integrating: The new process ties in well with Stauffer's growing interest in chemical metals. It is building a $300,000 semiworks plant at Richmond to produce columbium and tantalum pentachlorides. "Some" output will be sold. The rest will doubtless feed the nearby electron-beam furnaces, after undergoing a chlorides reduction process worked out by Stauffer under the research leadership of Charles Hunt (who is also cofounder and vice-president of Temescal Metallurgical).

Despite the upcoming deal, Mallory-Sharon appears to share Stauffer's faith in the electron-beam process. It has its own beam-melting furnace at Niles, O. If negotiations work out, M-S will continue development work under license from Stauffer and Temescal. Main reason for its withdrawing from the venture, M-S says, is that it wants to avoid getting involved in furnace building.

The status of process patent rights has not yet been settled; they will probably go to Temescal and Stauffer, with a licensing agreement and cash going to Mallory-Sharon.

CUTBACK COMPLETED, UPTURN BEGINS

(Expenditures for new plant and equipment, in million dollars. Source: U.S. Dept. of Commerce, Securities & Exchange Commission.)

	Actual 1st. qtr. 1958	Actual 2nd qtr. 1958	Estimated 3rd qtr. 1958	Estimated 4th qtr. 1958	Estimated total '58 spending
Chemicals and allied products	$340	$352	$362	$346	$1,400
Paper and allied products	141	146	163	152	602
Petroleum and coal products	587	629	720	729	2,665
Primary nonferrous metals	151	107	99	84	441
Stone, clay and glass products	102	101	104	97	404
Rubber products	37	30	35	34	136
Chemical process industries	1,358	1,365	1,483	1,442	5,648
All manufacturing industries	2,898	2,939	3,139	3,052	12,028

Spending Swerves Upward

Chemical process companies—having steadily applied the brakes on capital spending so far this year—are now starting to reach for the throttle.

The government's latest quarterly survey on new plant and equipment spending, issued this week by the Commerce Dept. and the Securities & Exchange Commission, indicates that the process industries are now planning to increase their expansion outlays gradually during the rest of this year.

The survey shows that U.S. industries as a whole plan to hold third-quarter capital spending at the same rate that was registered during the April-June period. For manufacturing industries, the rate is expected to rise slightly this quarter. For the entire year, U.S. business now expects to end up putting nearly $31 billion into new plant and equipment—$200 million more than the 12-month total that was anticipated just three months ago.

But the process companies seem to be shifting toward bigger expenditures. The newly estimated '58 total for chemicals and allied products spending is up slightly from last May's outlook; and process industries as a whole have been investing more money in capital projects each quarter this year. The $1.483 billion they now plan to spend in the third quarter is $30 million more than their expectation of only three months ago.

The Final Squeeze: These third-quarter changes are particularly noteworthy in view of the over-all '58 spending estimates. Six months ago, process companies had indicated in their replies for the March survey that they expected to spend a total of $6.4 billion this year for expansion and modernization. Three months later, they had lowered their sights to about $5.8 billion. For the survey reported this week, the total '58 budgets will be down to $5.65 billion, since actual second-quarter '58 spending was 12.5% below early estimates.

During the six months from February to August, makers of chemicals and allied products cut back their '58 capital spending plans 13.6%, from $1.6 billion to $1.4 billion.

For the fourth quarter, however, most observers expect another upward revision in CPI capital spending. Business confidence will likely be stronger during the brisk economic pickup now forecast for the fall. This, in turn, could add still more strength to the business revival.

Polypropylene Comer

Eastman Kodak is going into the polypropylene business. But it won't say whether it's trying to be the second or third U.S. company to start actual commercial production.

So far, Hercules Powder—onstream nine months at Parlin, N. J. — is the only commercial producer. Humble Oil & Refining Co. — subsidiary of Standard Oil of New Jersey — says it will have a 40-million-lbs./year polypropylene plant in operation at Baytown, Tex., by the end of '59.

Now, Eastman Chemical Products, marketing organization for Kodak's Tennessee Eastman and Texas Eastman chemical manufacturing divisions, says it has a polypropylene pilot plant already turning out sample quantities at Longview, Tex., where Texas Eastman produces high-purity propylene. ECP President W. S. Vaughn says Eastman intends to build a commercial-scale plant — but won't say whether it will try to beat Humble onstream.

Eastman's Fifth: Polypropylene, Vaughn remarks, "fits naturally into our plans for development of plastic materials." Eastman's plastics line now includes acetate, butyrate, propionate and polyethylene resins.

Of particular interest is Vaughn's statement that Eastman—although it had taken a license under Standard Oil of Indiana's process—is using a process invented by scientists in Tennessee Eastman's research laboratories at Kingsport, Tenn. Key to this process, Vaughn adds, "is the discovery of new catalysts, which the company has covered by U.S. and foreign patent applications."

Thus, Eastman — which "has been doing more and more research and development work in polyolefin chemistry"—claims to hold a basic position in polypropylene, both as to technology and as to starting material.

At Geneva, UN Stages Atomic 'Spectacular'



Full-size model of Shippingport reactor draws visitors to U.S. exhibit.

The second international atomic energy "spectacular" sponsored by the United Nations, nearing the end of its two-week run at Geneva, has already drawn varied comments from industry leaders both on the meeting's significance and on what will henceforth be industry's role in atomics.

Officially designated as the Second International Conference of the United Nations on the Peaceful Uses of Atomic Energy, this meeting far outdid the first conference three years ago in size and scope of both government and industrial exhibits, number of papers, special events, press conferences, attendance and publicity. However, the current meeting has lacked the one distinctive and paramount feature that characterized the 1955 show: glamorous novelty. This was the consensus among many delegates and observers who had also participated in the '55 Geneva conference.

Three-Ring Show: There have been three parallel acts this year, scheduled concurrently: government exhibits; commercial displays; and technical papers, lectures, speeches and interviews.

Extent of the meeting makes it clear that the United Nations is sponsoring gigantic and growing technological Olympic games. But emerging from the maze of diverse functions, gaudy displays, predictions, promotions and press superlatives were a number of persistent questions:

- Is it not time for a critical evaluation of the most effective, logical and systematic methods of achieving the stated goal of the United Nations—the maximum utilization of all types of peaceful uses of atomic energy for the benefit of all mankind?
- If there are further conferences in this same format, how will they be prevented from ramifying into even more bewildering complexity?
- Would it not be equally logical for the United Nations to organize similar conferences on other subjects, such as rockets and space research?
- Could not the tremendous effort and expense of this conference be better devoted to smaller, more specific and detailed international technical meetings such as last year's Brussels meeting on the reprocessing of nuclear fuel?

More than 2,200 papers from 46 governments and six intergovernmental organizations were accepted for inclusion in the conference. Of these, 650 were presented orally. Proceedings will be published in 33 volumes, compared with 16 volumes required for the '55 meeting.

Sessions Splitup: In an attempt to present the staggering diversity of technical subjects in a somewhat orderly fashion, papers were grouped in six categories. But since sessions for all groups were held at about the same time, it was impossible to hear all papers. Subjects ranged from feasibility of fusion power to extractive and physical metallurgy.

A 20-nation exhibition was housed in a special temporary structure, 548 ft. long and 164 ft. wide, built on the Palais des Nations grounds. Cost of the building was met by the exhibiting governments. And a commercial exposition on atomic energy was held at the Palais des Expositions in downtown Geneva. About 50 U.S. firms, in addition to the U.S. Atomic Energy Commission, were among those providing exhibits.

Prominent among the equipment of several nations, particularly the U.S., were experimental, schematic and conceptual designs of thermonuclear devices. Other equipment included operating fission reactors, models of nuclear power plants, and the like.

In imaginative planning, educational displays and literature and general public interest, many delegates felt that the U.S. exhibit far excelled those of other nations. Drawing the biggest crowds was the mammoth model of AEC's new Shippingport reactor *(photo)*, which towered over everything else in the exhibit hall.

All the Trimmings: Few, if any, bets were missed in providing the formalities and trimmings for this meeting. Although President Eisenhower did not visit the conference as he did in '55, he did participate in a transatlantic telephone call to officially open the U.S. exhibit.

Formal greetings from Eisenhower, Khrushchev, De Gaulle, Macmillan and other chiefs-of-state were read at the opening session.

COMPANIES

Hubbard-Hall Chemical Co. (Waterbury, Conn.) has purchased majority interest in Chem-Salts, Inc. (Atlanta) for an undisclosed sum. The Georgia firm manufactures metallic chlorides and copper cyanide.

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Chromalloy Corp. (New York) has exchanged 65,519 shares of its stock for all outstanding shares of Propellex Chemical Corp. (Edwardsville, Ill.) to acquire the Midwestern firm. Propellex, a manufacturer of solid propellents, explosives and other specialties, will operate as a Chromalloy division.

•

St. Regis Paper Co. has extended to Sept. 29 its offer to exchange stock for outstanding common shares of Growers Container Corp. (*CW, Aug. 23, p. 26*). The paper company has acquired about 60% of Growers' stock during its current offer, in addition to its original 31% interest.

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Bard Pharmaceuticals, Inc. (Yonkers, N.Y.), is acquiring the plant and laboratory facilities of G. F. Harvey Co. (Saratoga Springs, N.Y.). Bard President Robert Broh-Kahn says the move will enable his three-year-old firm to double its present manufacturing capacity and to produce ointments as well as to boost its output of capsules, coated and uncoated tablets, powders, granules, and medicated liquids. The Harvey unit will be operated as Bard-Saratoga Laboratories.

EXPANSION

Oxygen: Air Reduction Sales Co. (New York) will build a plant at Butler, Pa., to supply up to 84 million cu.ft./month of pipeline oxygen to Armco Steel Corp. The new unit will expand Air Reduction's existing oxygen, nitrogen and argon facilities.

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Industrial Gases: Liquid Carbonic Division of General Dynamics Corp. has completed two San Francisco Bay area industrial gas installations worth $2.5 million. Products: oxygen, nitrogen, argon at Oakland; electrolytic hydrogen and oxygen at San Carlos.

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Petrochemicals: Lion Oil Division of Monsanto Chemical Co. will expand its El Dorado, Ark., refinery capacity from 29,000 to 33,000 bbls./day. In addition to other refinery improvements, a propylene tetramer unit will provide raw material for Monsanto's Inorganic Chemicals Division. Completion date: early in '60.

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Chemical Instruments: Coleman Instruments, Inc. (Maywood, Ill.) is expanding its plant for manufacture of pH meters and analytical instruments. The new building will have soundproofing, high-level illumination, and complete atmospheric control. An adjacent wooded area is being landscaped to provide a recreational park for the company's employees.

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Organic Chlorides: Dow Chemical of Canada (Toronto) will start up process lines for methyl chloride and methylene chloride this fall. Production of the two compounds will mark the first time that Canada has had an independent supply. Dow will produce the two at its Sarnia plant.

FOREIGN

Synthetic Rubber/France: Shell-Saint Gobain has joined with Texas Butadiene Chemical and G. L. Cabot to build and operate a 50,000-tons/year butadiene-styrene rubber plant near Marseilles. Startup: early '61.

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Terephthalic Acid/Russia: Russia is negotiating with Kawasaki Kasei Kogyo K.K. (Tokyo) to import a 250-tons/month terephthalic acid plant. The Soviets aim to produce 45,000 tons/year of the synthetic fiber intermediate, eventually.

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Chemicals/Great Britain: With $21-million sales for first-half '58, Monsanto Chemical Ltd. and its United Kingdom subsidiaries showed a 5½% drop from sales in the same period last year. Net income: before taxes, $1.5 million; after taxes, $695,000.

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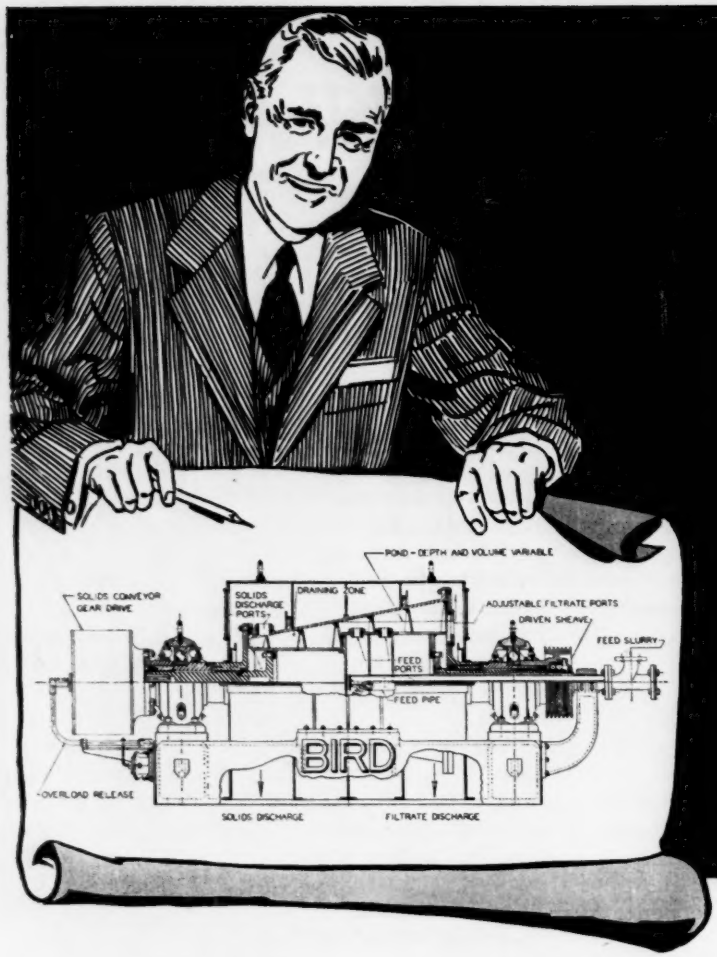
Fertilizer/Austria: Stickstoffwerke AG., Austria's nationalized nitrogen enterprise, reports higher production and sales in first-half '58 than in the same period last year. Nitrogen fertilizer output rose 5.5% to 369,000 metric tons while sales, cutting into inventory, rose to 403,000 metric tons. Sulfuric acid and superphosphate output was also up over first-half '57 production, the Austrian government says.

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Pharmaceuticals/Iran: Allen & Hanburys, Ltd., will build and operate a $2.8-million pharmaceuticals plant near Teheran, Iran. Under a 15-year agreement with the Iranian imperial welfare organization, the British firm will provide technical executive personnel, train Iranian operators in its United Kingdom plants, and supply a wide range of British-manufactured pharmaceuticals until the plant is completed.

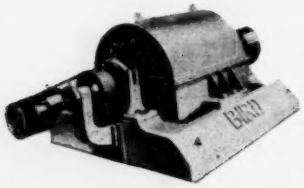
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Photographic Film/India: The Indian government's recent decision to set up a photographic film plant as a state-owned operation appears to assure that the contract will be awarded to East Germany's state-owned Agfa concern. Kodak Limited (London) also had submitted an offer to build the plant, but as a privately owned enterprise and in collaboration with private interests in India. The $15-million project is slated to turn out motion picture and X-ray films as well as photographic paper. It will be in operation by '61 (before India's second five-year plan ends).



How much can this BIRD cut your production cost?

The *Bird Continuous Solid Bowl Centrifugal Separator* may very well be the machine that can do your solid-liquid separations at lowest cost. That has proved true in scores of applications.



In any case, it's easy to find out. If we do not already have the answer, based on actual field experience, the Bird Research and Development Center can come up with it in a hurry. And the findings will be authentic and unbiased because Bird builds the most comprehensive range of solid-liquid separating equipment.

Filtration is too important to product quality and production economy to "let well enough alone" or to guess what method or machine might be best for the job.

Now is a good time to get the true facts — the comparative figures.

BIRD

LEADING AUTHORITY ON SOLID-LIQUID SEPARATIONS

Builders of

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Newsletter

CHEMICAL WEEK
September 13, 1958

A chemical industry dissent to plans to boost East-West trade is a number-one topic of discussion at informal talks between Commerce Dept. and industry officials.

The Commerce Dept. is currently conferring with those industry executives on its world trade advisory committee. The problem, as Commerce sees it, is to get some sort of agreement on which items—materials and production equipment—the department may now safely license for export to Iron Curtain nations. This all results from a general U. S. commitment to go along with at least some relaxation of trade curbs, as recommended by the NATO coordinating committee in Paris last month.

Commerce Dept. spokesmen don't think easier export license regulations will significantly boost U. S. trade with the Communist bloc. The question is: Which export items would contribute to Russian and satellite warmaking potential and thus should be continued under embargo?

Some chemical producers are said to favor exploring every marginal Iron Curtain market for chemical products. The Manufacturing Chemists' Assn., on the other hand, replying to a Commerce Dept. request for its views on Soviet Premier Khrushchev's recent proposals for more Russian-U. S. trade, takes the stand that any relaxation of curbs on chemical products, equipment or technical information would bolster Russia's military power.

Last week also, a visiting delegation of Polish chemical industry officials reported that U. S. chemical industry representatives had expressed an interest in more trade with Poland. The Polish are interested in techniques for making coal- and coke-derived chemical products, synthetic fibers, and petrochemicals.

The Commerce Dept. has not yet made any final decisions on new trade regulations covering any specific products, except to place new, tighter curbs on certain military equipment component parts.

•

Changes in government metals stockpiling policy were confirmed officially by the new Office of Civil and Defense Mobilization last week.

Of the 75 strategic materials the government has been buying and storing since outbreak of the Korean conflict, only three are still on the official "shopping list"—amosite asbestos, small diamond dies, and muscovite block and film mica. Purchases of these items will be continued only until stocks are large enough to provide a three-year supply.

All other materials are at three-year levels except for eight items —bauxite, chromium, fluorspar, jeweled bearings, chemical-grade manganese, palladium, selenium, silicon carbide. Stocks of these will be brought up to the three-year level by bartering domestic surplus crops overseas.

Other current government incentive purchase programs will continue in effect until their expiration dates, which range from the end of 1958 to the end of 1959. Commodities involved include aluminum, nickel, copper, fluorspar, mercury, manganese and tungsten. However, no new contracts will be signed.

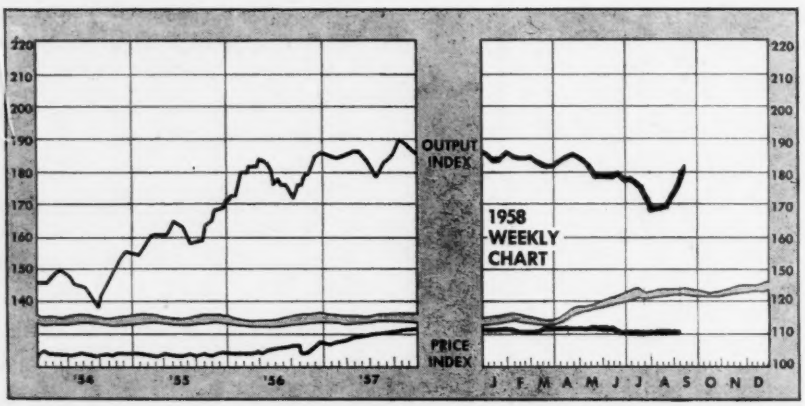
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The Government hopes to start work under the new saline-water law before year's end. The President signed a new research authorization for Interior Dept.'s Office of Saline Water last week. The law gives authority for contracting for one demonstration plant before Congress comes back in January. Five demonstration plants for conversion of salt water into fresh water and two plants to convert brackish water are authorized.

•

Military research and develoment and other chemical-related defense programs are once more under the gun of an Administration economy drive aimed at combating the inflationary threat. The Air Force Research and Development Command, for instance, is trying to trim at least $15 million from this year's over-all costs to meet increased expenses at Cape Canaveral.

Outcome of the return to pre-Sputnick economizing will be new delays in getting advanced projects under way, quicker decisions to wash out competing projects, and lower production rates for latest weapons than might have been scheduled before.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	182.0	178.0	182.5
Chemical Week wholesale price index (1947=100)	110.7	110.7	110.9
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	44.73	44.47	42.80

MONTHLY Production (Index 1947-49=100)	Latest Month	Preceding Month	Year Ago
All manufacturing and mining	125	132	135
All chemical products	171	176	174
Industrial chemicals	172	179	195

AMSCO IS FIRST

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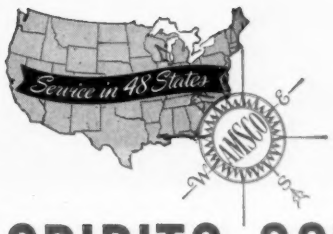
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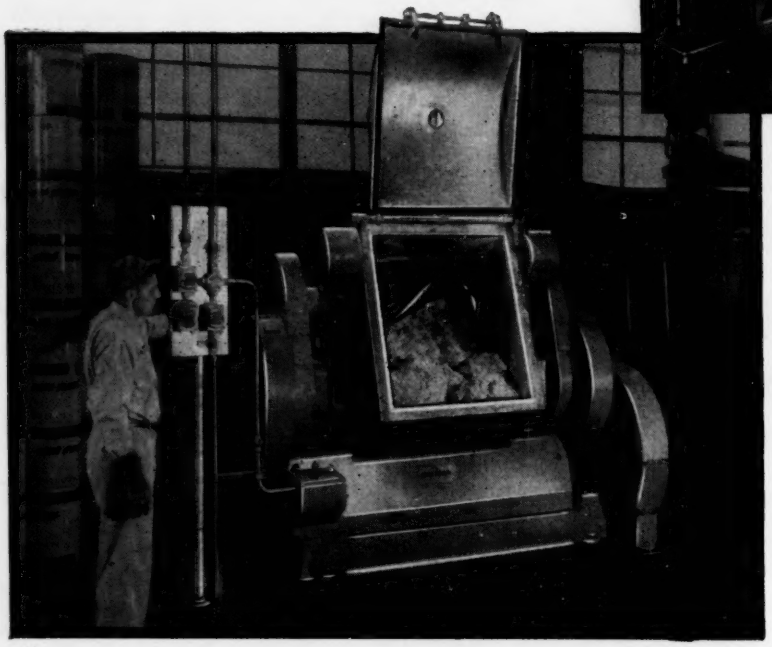
BAKER PERKINS MIXERS duplicate laboratory results on a production scale at WILLIAMSON ADHESIVES, INC.

Williamson Adhesives, Inc., of Skokie, Ill., are engaged in custom compounding of a wide variety of pre-mix molding materials for sale to the compression molding industry. To insure duplication of pilot results, Williamson uses Baker Perkins Mixers in both laboratory and production operations. A small 2.25 gallon Baker Perkins batch mixer is used in the laboratory for making test runs and developing new products, while a 100 gallon B-P mixer is used for actual production. As the small unit is identical in design and function to the large mixer, Williamson chemists can follow their manufacturing processes from the pilot plant stage to full scale production and maintain the same standard of quality.

The versatile B-P 100 gallon mixer can handle 500 pound loads of widely dissimilar materials; soft doughs, plastics, heavy viscous semi-liquids or dense, fibrous masses.

With the aid of careful temperature, moisture and operational controls possible with Baker Perkins equipment, Williamson is able to increase capacity, control quality and extend the range of materials which may be processed. The benefits gained with B-P Mixers at Williamson Adhesives, Inc., are proof that BAKER PERKINS Mixers are best. If you have a mixing problem, a Baker Perkins Sales Engineer is a good man to call in.





360



See our insert in Chemical Engineering Catalog for additional information.

BAKER PERKINS INC.

CHEMICAL MACHINERY DIVISION • SAGINAW, MICHIGAN

Preventive maintenance at Columbia-Southern plant helps cut . . .



Emergency breakdowns by 25%



Maintenance manpower by 15%

Making Preventive Maintenance Pay Off

The key figures above offer some of the strongest evidence yet available on how preventive maintenance can pay off. Compiled by Columbia-Southern Chemical Corp.'s Corpus Christi plant, the data shows the savings that have been achieved over the past four years with a program begun over 12 years ago.

The contribution of C-S's well established program hasn't been one of mere trimming of fat and correcting of poor maintenance practice, often the case with new programs. The cuts have been made during a period of general maintenance improvement and high plant production levels, and point up the key feature of the program—complete understanding and cooperation between maintenance and production departments.

But because of the close tie between production and maintenance, Ralph Price, superintendent of maintenance at the plant, doesn't put too much emphasis on statistics. There are so many interrelated factors that the reduction in production losses due to emergency breakdown can only be estimated. And neither of the above figures can be pinned solely to preventive maintenance.

Says Price: "The exact reason for equipment failures is seldom clearly defined and the responsibility for loss of production must be shared jointly by maintenance and production."

Aims and Means: The aim of preventive maintenance is to enable the production team to utilize more than 90% of the life of a unit, yet allow the maintenance department to repair it before it actually breaks down. Here's the way C-S goes about it:

First, production supervisors' forecasts of equipment demands and maintenance supervisors' forecasts of equipment repair time are coordinated by the plant's full-time preventive maintenance engineer.* Speeding his analysis and recordkeeping is a McBee punch-card file in which records of all production equipment have been accumulated.

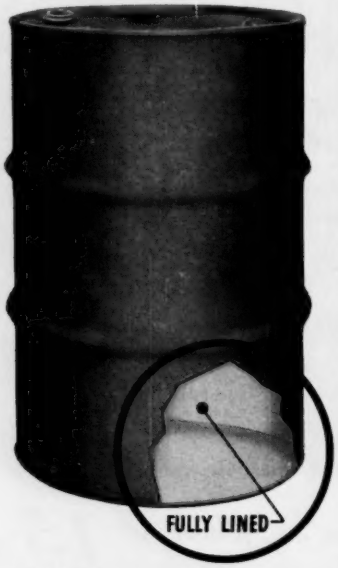
All work-order information, plus material and labor costs, and deviations from the original job description are punched out for each equipment repair. Information important in predicting future preventive maintenance scheduling is abstracted and posted on a Visirecord card, which is placed in a tickler file (to remind supervisors of upcoming jobs).

The Halves: Preventive maintenance, which accounts for about 40% of total mechanical repair man-hours is divided equally between "intermediate preventive maintenance" (re-

*Excluded from the program are building and structural maintenance, which is mainly preventive, and maintenance of such electrical items as transformers and circuit-breakers, which are handled under a separate program.

CUT COSTS 25%

An important factor in the cost of many liquid chemicals is the cost of shipping containers. Use Binder *Rebuilt* Drums, cut costs.



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placement of specific components) and "general preventive maintenance."

General preventive maintenance overhauls are set up at regular, predetermined intervals, coinciding with equipment shutdowns. Aim is to return equipment to "brand-new" condition.

"This is the ideal form of maintenance and we continually strive to place more and more equipment in this category," says Price.

Critical Components: Helping to place more equipment into the general overhaul category is the Corpus Christi plant's corrective or improvement maintenance program. In this plan, an attempt is made to bring all the component parts of a piece of equipment into perfect "balance" so that each wears out at the same time.

"The goal is unattainable, of course, but our approach involves identification of the 'critical component' in each mechanical repair we make. Each time we think we've found the critical part, we put that onto the McBee card, so that we can check it later. This way, we can spot the weakest link, perhaps strengthen it," says Price.

"All production equipment is included in the corrective maintenance program. But there are practical limits beyond which preventive maintenance will not pay," he adds.

Expanding Program: Despite Columbia-Southern's efforts, about 50% of total mechanical repair time cannot yet be regarded as preventive maintenance. This includes work that does not fall into recognizable patterns, but does not include emergency or breakdown repairs (another 5% of total repair time). Regular maintenance that falls into recognizable patterns is added to the preventive program as it becomes economical to do so.

For example, most of the plant's pumps are not included in the preventive program. The majority of small pumps are allowed to run to failure, are replaced from stores. This procedure was not thought to inflate maintenance costs, according to Price, but it is now being re-examined as a possible way to cut costs.

Also, all motors under 50 hp. have been excluded from the preventive maintenance program. The plant has found that the average motor life is about seven years, but it can't economically justify motor replacement on such a seven-year schedule.

Most pumps and small motors, however, are included in the maintenance department's inspection program, and many impending failures are caught. The inspections, while not charged as part of preventive maintenance's time, help determine the preventive maintenance inspection schedule.

Inspections account for about 5% of total repair time, are made by first-class mechanics once every three months, and cover only defects that can be detected by sight, sound or touch. Results of the inspections are turned over to the production supervisors who request corrective action.

All in all, the Columbia-Southern system requires a combination of inspection, record keeping, and all-around attention to detail. But as data shows, it can pay off handsomely.

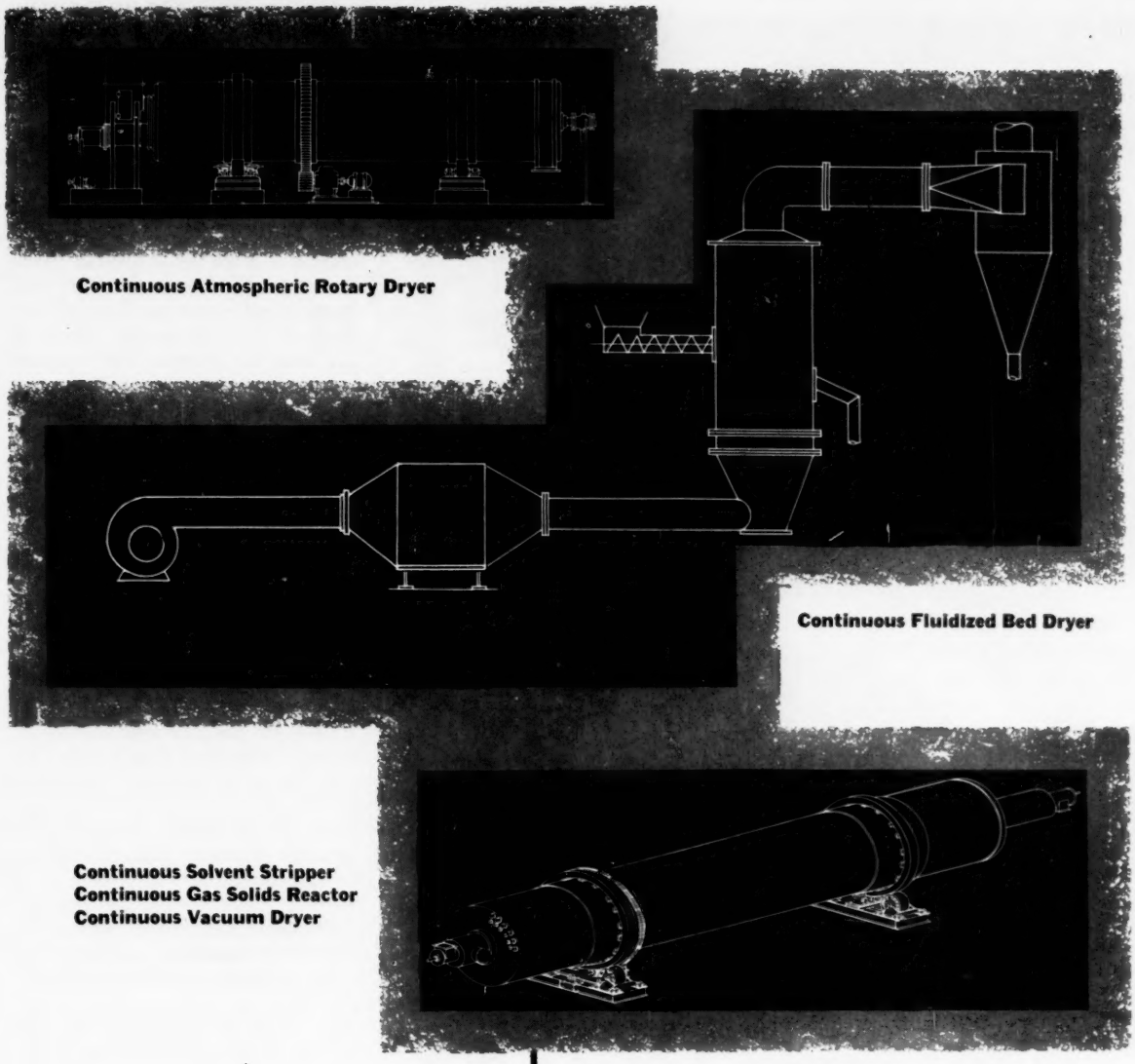
EQUIPMENT

Radiation Processing: Applied Radiation Corp. (2404 N. Main St., Walnut Creek, Calif.) is out with Mark 20-J21, a new, 10-million-volt, 21-kw. linear accelerator for large-scale radiation processing of plastics (e.g., polyethylene), solid rocket propellents that require curing, chemicals and food. The unit is touted as an economical, reliable source of ionizing radiation that can be integrated into multiunit systems. Demountable construction overcomes maintenance problems common to most linear accelerators where components are sealed in, permits various parts to be serviced in a preventive maintenance program. Spare sections can be provided for use during servicing.

The Mark 20-J21 is said to provide process radiation at $1.36 per kwh., based on one accelerator operating 8,000 hours per year. If two accelerators are used, operating cost drops to $1.02 per kwh.

•

Impervious-Graphite Pumps: Union Carbide's National Carbon Co. Division (30 E. 42nd St., New York 17) has added three new corrosion-resistant centrifugal pumps to its line of Karbate impervious-graphite pumps. The two largest sizes nearly double capacity of present models, can deliver up to 150 gpm., compared with a top of 80 gpm. for others. The new pumps, designated 22-FAL, 28-FAL



Continuous Atmospheric Rotary Dryer

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Now, at one convenient location, you can test-dry your materials in a variety of equipment

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CAO-1
(2,6-Ditertiary-Butyl-Para-Cresol)
Inhibits gum and peroxide formation in high-octane aviation gasolines . . . turbine and jet engine fuels.

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(4-Methyl-6-Tertiary-Butyl Phenol)
For White and Light Colored Rubber. Tires, household, medical products.

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For Polyethylene wire coatings, Rubber and Petroleum products.

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In addition to antioxidants, Catalin chemical products include bacteriostats, oil additives, alkylation products and special chemicals.

Catalin also produces a wide range of urea, phenolic, cresylic, resorcinol and melamine industrial resin formulations.

Catalin plastics include polystyrene, polyethylene and nylon molding and extrusion compounds.

PRODUCTION

and 31-FAL are equipped with 1-, 1½- and 2-hp. motors, deliver maximum total heads of 33, 51 and 67 ft.

•

Pressure Transmitter: A new absolute pressure transmitter, Type 13AA, accurate to 0.5% of full scale, is offered by The Foxboro Co. (Foxboro, Mass.). Unit produces 3-15-psi. linear signal proportional to absolute pressure. Full transmitter power is available to operate any standard receiver over long distances because there is no direct drive of pen or pointer. Measurement ranges are continuously adjustable between 0-50 and 0-250, or 0-200 and 0-850 in. of water. Maximum operating temperature: 250 F.

•

Temperature Measurements: The Bristol Co. (Waterbury 20, Conn.) is out with two new temperature-measurement instruments. The Armorox thermocouple for measuring temperatures to 2,000 F at pressures to 50,000 psi., is metal-sheathed and ceramic-insulated. The other instrument is a traveling tunnel-kiln pyrometer designed to record temperature of an entire run; it uses an armored extension cable attached to an outside recorder.

•

Conveyor Belt: For conveying hot and sticky materials, H. K. Porter Co.'s Quaker Rubber Division (Philadelphia 24) offers a new Teflon-coated glass-fabric conveyor belt. The belt has good chemical and solvent resistance (Teflon will react with only alkali metals, fluorine at high pressure and temperature, chlorine trifluoride, perfluorinated organic solvents above 570 F.) The belt will withstand temperatures from —100 to 525 F.

•

Cement Couplings: Permacel 55 Cement Bandage is a new product of Permacel (New Brunswick, N.J.) for making permanent cement couplings on multiduct concrete, clay and tile pipes and conduit. The bandage is a portland cement composition. For use as a coupling, it is soaked in water, drained and laid under the end of the pipe or duct. After the next section of pipe has been put in place, the bandage is pulled up over the top, smoothed in place and stapled. Coupling is said to give a positive seal even when pipes have chipped and broken ends.

DU PONT
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BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

PRODUCT NEWSLETTER

featuring **THF** *tetrahydrofuran*

Du Pont THF assumes an important role as a reaction medium

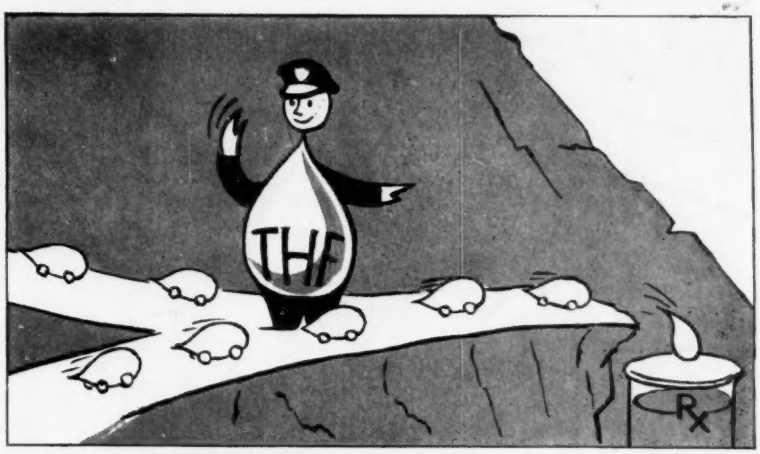
Important producers of chemicals and drugs are finding tetrahydrofuran the most economical solvent for a wide range of commercial chemical reactions. Through its ability to direct reactions, tetrahydrofuran promotes high yields from Grignard, sodium acetylide, lithium aluminum hydride, and many reduction reactions—including hydrogenations. And because it boils 30°C. higher than diethyl ether, tetrahydrofuran makes it possible to operate at higher temperatures and so raise reaction rates without recourse to above-normal pressures.

THF is a good medium for reactions involving formation of complexes between sodium and polycyclic aromatic hydrocarbons such as sodium naphthalene, and has proved useful as a solvent in the preparation of fluorohydrins from epoxides and anhydrous hydrogen fluoride. In the field of metal hydride chemistry, THF may be used as a solvent for the preparation of such compounds as lithium borohydride, sodium aluminum hydride and diborane. Solutions of alkaline earth-metal hydrides in THF provide a good means for reducing organo acids, esters, aldehydes and ketones to alcohols.

The ether structure of THF, its stability and its high solvent power for a wide range of organic materials combine to make this versatile solvent worthy of your consideration for many types of chemical reactions.

Tetrahydrofuran also has gained widespread application in the plastic field because of its superior solvent power for many resins:

In fabric—and sheet coatings—the exceptional solvent power of THF permits use of high-molecular-weight polyvinyl chloride resins and promotes good adherence of the topcoat. The high solids content of PVC solutions in tetrahydrofuran and the solvent's volatility and high diffusion rate permit increased machine speeds.



THF's wide solvent action, higher boiling point and ability to *direct* certain reactions mean better yields and higher production rates in manufacture of many chemicals and drugs.

Film casting from solutions of polyvinyl chloride in THF is another important application for this powerful solvent. Increased output per machine, production of high-molecular-weight films, and preparation, storage and use of solutions at room temperature are advantages to be gained in casting PVC film from tetrahydrofuran.

Printing inks incorporating THF as one of the solvents are being used widely for printing polyvinyl chloride film and supported fabrics. The high solvent power of THF gives quick "bite" into the article being printed, and its rapid evaporation rate often permits increased productivity per machine.

Commercial adhesive formulations for plastics and films frequently include THF as the active solvent. Here it serves the double purpose of dissolving the resin and giving a good "bite" into the material being joined to yield exceptional bond strengths.

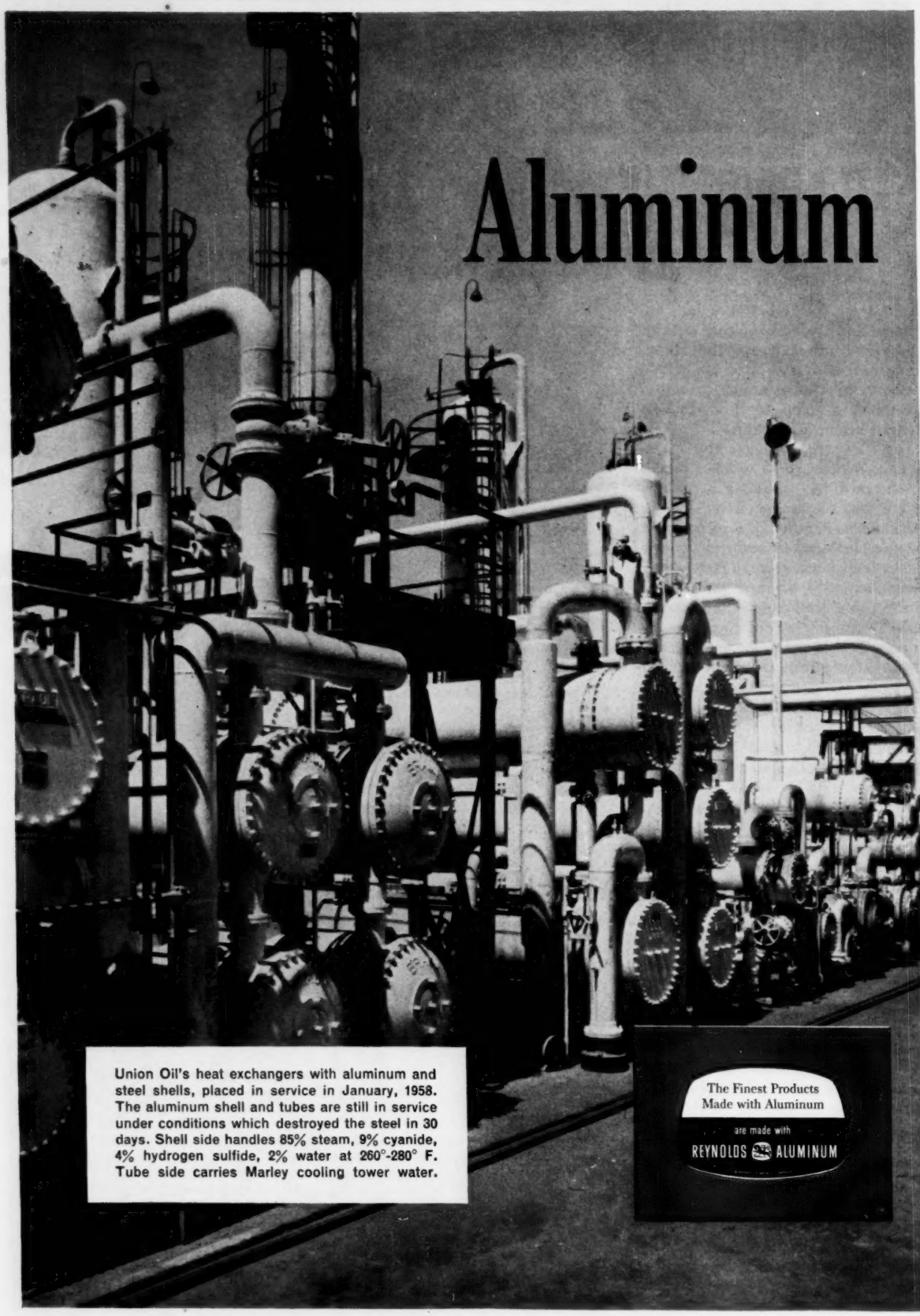
Send for additional information on THF. We'll be glad to work with you in developing your particular application of this amazing solvent.

PROPERTIES

Appearance	Colorless, mobile liquid
Odor	Etherlike
Molecular weight	72.10
Freezing point	–108.52°C.
Boiling range	65°–67°C.
Specific gravity (20°/4°C.)	0.888
Weight, lb./gal. (20°C.)	7.4
Flash point (Tag closed cap)	6°F.
Vapor pressure, mm Hg. at:	
15°C.	114
25°C.	176
35°C.	263
45°C.	385
55°C.	550
65°C.	760
Surface tension, dynes/cm. (25°C.)	26.4
Solubility	Miscible with water, soluble in most organic solvents

For more information just drop a line to Du Pont at the address below.

E. I. DU PONT DE NEMOURS & CO. (INC.)
ELECTROCHEMICALS DEPARTMENT
CHLORINE PRODUCTS DIVISION CW-9
WILMINGTON 98, DELAWARE


Aluminum
Union Oil's heat exchangers with aluminum and steel shells, placed in service in January, 1958. The aluminum shell and tubes are still in service under conditions which destroyed the steel in 30 days. Shell side handles 85% steam, 9% cyanide, 4% hydrogen sulfide, 2% water at 260°-280° F. Tube side carries Marley cooling tower water.
The Finest Products Made with Aluminum
are made with
REYNOLDS ALUMINUM

Heat Exchangers Last Longer...

up to 7 times longer for Union Oil

Union Oil Company of California is converting several of its shell and tube heat exchangers—and parts of these exchangers—to Reynolds Aluminum. Main reason: aluminum lasts longer in many heat exchanger applications, up to 7 times longer.

For example, in Union's heat exchangers which handle waste water from a refinery cat tower, steel condenser tubes lasted only a few weeks before corrosion made them useless. Aluminum tubes, now in the same service, last 7 times as long handling the same corrosive fluids.

In the same application, steel tube sheet and baffles lasted about 5 months before they had to be replaced. Union engineers replaced these with aluminum and installed aluminum bundles in January, 1957. They are still in service.

The bare tubes of Union's heat exchangers are Reynolds Aluminum alloy 3003-H14, and the tube sheets and baffles are 6061-T6.

Union Oil's aluminum heat exchangers really save in service cost. On a dollars per square foot of heat transfer area per year base, aluminum units are nearly *5 times lower in cost* than the same units with seamless mild steel. This does not include handling costs, which favor lightweight aluminum.

Initial cost, incidentally, is virtually the same for aluminum and steel in these uses.

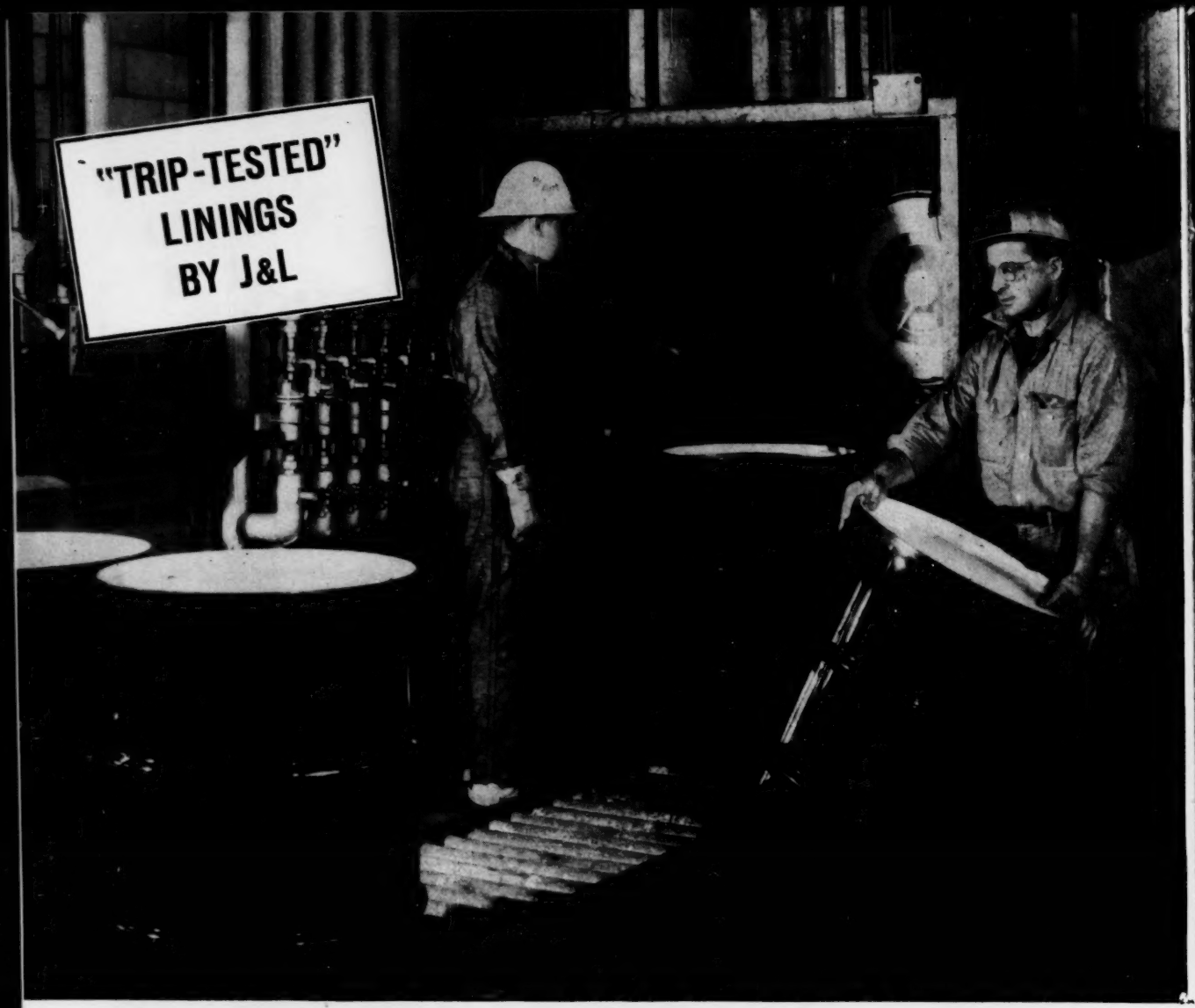
Heat exchangers are just one of many places Reynolds Aluminum is cutting costs in this industry. Its resistance to corrosion, its passivity, light weight and strength make aluminum *the* logical material for tanks, vessels, jacketing, piping, tubing, and other applications where corrosives must be handled or stored.

To learn how aluminum can cut your costs, write the people who know aluminum and its uses in the chemical and petroleum industry—*Reynolds Metals Company, P.O. Box 2346-CM Richmond 18, Virginia.* Or contact your local Reynolds branch office, listed under "Aluminum" in the classified phone book.



Write today for Reynolds free bulletins—
"Aluminum for Heat Exchangers" and "Keys to Corrosion".

REYNOLDS ALUMINUM



HOW J&L EPOXY-PHENOLIC LININGS

protect highly reactive liquids for Allied Chemical Corporation

"We package di-isocyanates in J&L steel 55-gallon drums lined with two coats of epoxy-phenolic to avoid contamination," says Mr. C. S. Woodwell, chemical engineer at Allied Chemical's National Aniline Division, Moundsville, W. Va. "Di-isocyanates must be packaged with extreme care, even protected from contact with moisture in the air."

Difficult packaging of this highly reactive material requires perfect linings and procedures. Drums obtained from the Jones & Laughlin Container Division have held di-isocyanates in perfect condition for over a year.

Extensive J&L laboratory tests and customer-service reports prove conclusively that J&L drums and pails can protect most difficult chemical and petroleum products.

Nine J&L container plants located near major chemical and petroleum producing areas provide fast, round-the-corner service. J&L lined containers—over 2,500,000 in 1957—have carried thousands of chemical products safely to their destinations.

It will pay you to call in a J&L container specialist to discuss lining problems. Simply call J&L Container Division, 405 Lexington Avenue, New York (YU-6-6600); or call a J&L branch office at Atlanta; Bayonne, N.J.; Boston; Chicago; Cleveland; Kansas City, Kansas; Lancaster, Pa.; New Orleans; Philadelphia; Pittsburgh; Port Arthur; and Toledo.

STEEL

Jones & Laughlin Steel Corporation

CONTAINER DIVISION

405 LEXINGTON AVENUE, NEW YORK, N. Y.

TOP CHEMICAL EXPORT ITEMS TAKE A TUMBLE

Commodity group	*January-June* 1958	1957 (dollar value)	*Percent change*
Polyethylene, finished and unfinished, excluding film and sheeting	$35,981,341	*	*
Chemical specialty compounds, NEC	28,162,050	$29,819,946	—5.6%
Organic chemicals (except cyclics)	22,143,672	23,349,427	—5.2
Lubricating and fuel oil additives	14,073,572	18,032,311	—22.2
Antibiotics, broad spectrum, including dosage forms, NEC	12,538,247	*	*
Insecticides (15% and over polychloride), NEC	11,675,961	*	*
Carbon black, furnace type	11,577,843	11,255,946	2.6
Drugs and medicinals, prepared and including dosage forms	11,207,640	10,154,361	11.6
Concentrated superphosphate (over 22% phosphoric acid)	11,090,090	8,562,010	28.5
Styrene, polymer and copolymer resins	10,926,631	9,223,111	18.3
Film and sheeting, excluding polyethylene	9,919,621	*	*
Phosphate rock	9,055,125	*	*
DDT formulations containing 75% or more DDT	9,032,459	*	*
Compounds or mixtures containing antibiotics or sulfonamides	8,950,624	8,977,983	—0.4
Boric acid and borates, crude, refined and compounds, NEC	8,887,532	8,241,981	7.8
Ready-mixed paints	8,484,022	9,117,097	—7.0
Styrene monomer	8,478,657	*	*
Vitamin preparations, dosage forms	8,301,396	8,803,545	—5.6
Carbon black, contact and channel types	7,948,315	10,157,606	—21.7
Alcohols, including glycols, NEC	7,884,533	7,173,866	9.9
Industrial chemicals, NEC	7,870,439	7,799,783	1.0
Antiknock compounds, not of petroleum origin	7,283,783	9,255,555	—21.3
Ammonium sulfate, fertilizer material	7,041,198	15,954,439	—55.9
Coal-tar and other cyclic dyes, NEC	6,988,392	8,734,802	—19.8
Cellulose ester plastics, excluding molding materials	6,141,568	7,320,436	—16.3
Titanium dioxide and pigments	6,032,126	12,253,386	—50.8

*Not available because of change in classification system.

Export Outlook: Down from a Record Peak

Exports of 19 key chemical commodities are running 10% behind the '57 pace. But despite this rather large dip, there are indications that U.S. producers have a fighting chance of maintaining their total '58 exports at levels equal or close to '57's. That's what a new CW analysis of the latest Commerce Dept. figures shows.

Last March, exporters predicted no worse than a 5% drop for the year (*CW, March 15, p. 73*); January-June figures are bearing out the forecast. First-half '58 chemical exports totaled $686.6 million, down 3.6% from comparable '57 exports ($712.0 million).

The drop apparently is largely confined to the major commodity groups. In the top 19 groups directly comparable**, the slide amounted to $25.4 million. This broad group accounted for 29% of total first-half exports.

Exporters of titanium dioxide and fertilizer-grade ammonium sulfate suffered most in declining world trade. U.S. shipments of ammonium sulfate slipped 56% (to $7.04 million), titanium dioxide and pigment exports declined 51% (to $6.03 million). Producers of lubricating and fuel oil additives, nonpetroleum-based antiknock compounds, contact and channel types of carbon black, and coal-tar dyes also took it on the chin. The drop in dollar value of exports in these categories ranged from 20 to 23%.

Ethylene glycol shipments also fell sharply (down 79%), failed to make the list of top exports. In first-half

**Several other large commodity classifications cannot be compared because of changes in the classification.



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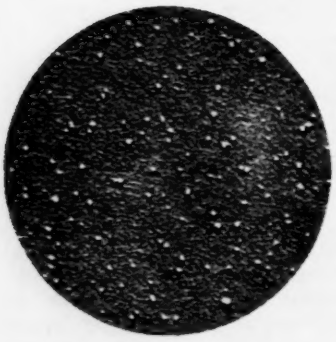
What can *you* do with an aqueous sol of colloidal silica—particle size 15 millimicrons—that dries into *insoluble* silica films?

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

SALES

'57, exports were $8.07 million. In Jan.-June '58, they totaled $1.66 million.

Bright Spots: But if the news was gloomy for some, it was cheerful for others. Concentrated superphosphate exports climbed 29% to $11.1 million and styrene polymer and copolymer shipments expanded to $10.9 million (up 18.3%). Exports of the prepared drug and medicinal, alcohol and boric acid and borate groups advanced 8 to 12%. Furnace-type carbon black exports moved up slightly (2.6%) totaling some $11.6 million in Jan.-June '58. And a catch-all group of industrial chemicals was 1% above the '57 showing ($7.8 million).

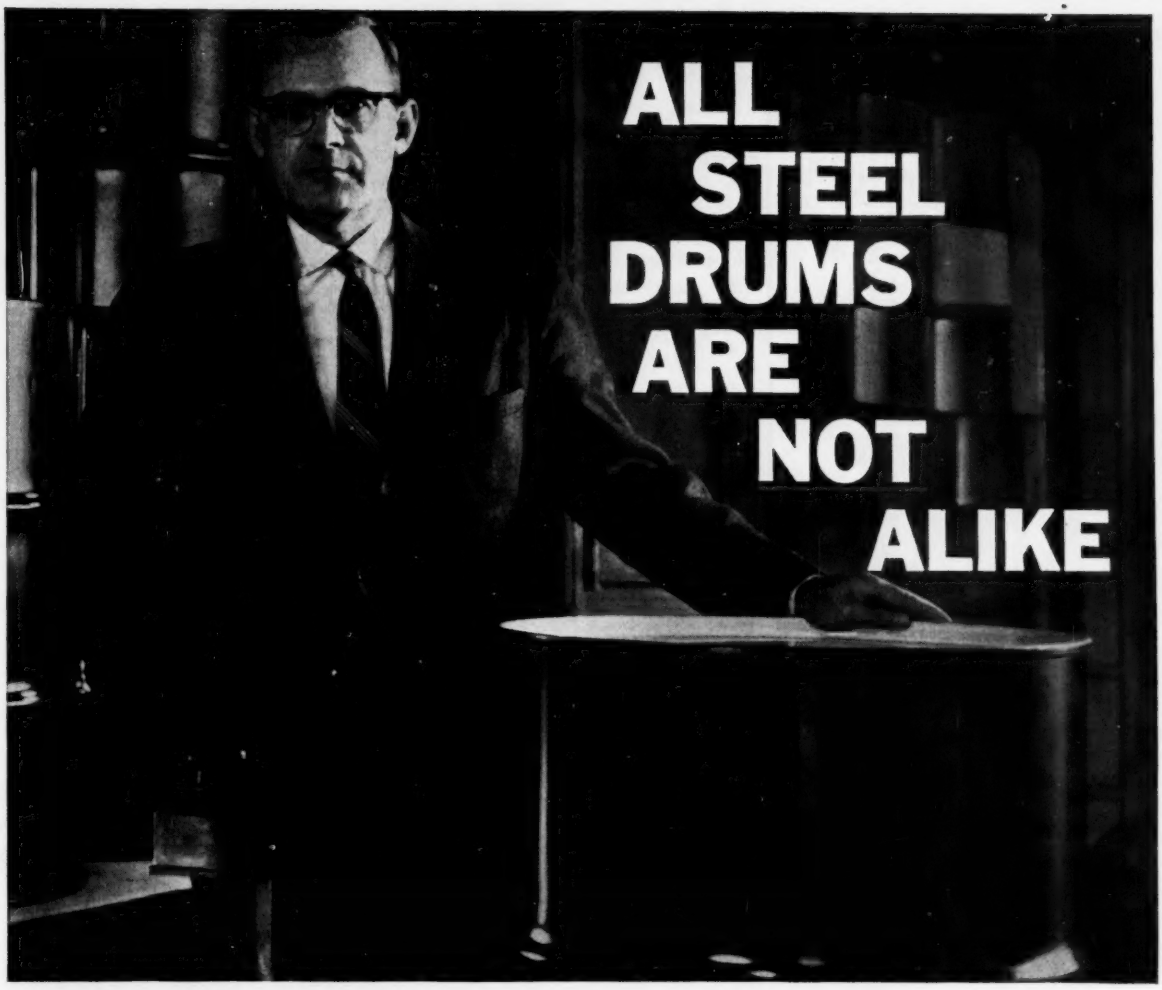
Generally, the swings in large commodity groups reflect the trend in the Commerce Dept.'s broad-scope classifications. Medicinal and pharmaceutical exports rose 6% to the $143.2-million mark during first half of '58. Coal-tar chemical cargoes forged ahead nearly 13% in the same period (from $40.5 to $45.8 million).

Fertilizer exports, following the pattern set by ammonium nitrate, tumbled $16.7 million to $56.2 million, a whopping 23% drop. Pigments, paints and varnish materials skidded some 17% to a total of $49.9 million. Declines in the soap and toilet preparations (off 14.4%) and the toluene classifications (off 8.7%) were of limited significance because of the small dollar value.

In two key broad-scope groups, the declines were modest. Chemical specialty exports have dipped only 2% (from $265.7 to $260.2 million). And industrial chemicals shipments, at the $105.7-million level, stayed near '57.

Behind the Slide: Dollar shortages and increasing foreign production are the main factors responsible for the slight export drop. Depressed prices of nonferrous metals, for example, have seriously affected the dollar-earning capacity of such countries as Peru, Chile and Bolivia. And the U.S. recession has had effect on world trade. Moreover, Russian exports are becoming a factor in some areas.

Despite the difficulties that world traders are facing this year, many are hopeful that their earlier predictions will stand up. And the evidence from the first six months is reassuring; U.S. chemical exports appear headed toward a total very near the '57 record of $1.4 billion.



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OK for Lighter Drums

Light-gauge steel drums are nearer this week to the loading docks of chemical shippers. The National Classification Board of Motor Carriers, stealing a jump on its railroad counterpart, has okayed the 20/18-gauge, 55-gal. drum for multitrip use with nonregulatory (nonhazardous) products during a three-year period.

The 20/18 drum (*CW, June 28, p. 71*) has a 20-gauge (0.0359 in.) shell and 18-gauge (0.0478 in.) heads, weighs some 7 lbs. less than the standard, 18/18 drum. The decision will take effect in 30 to 90 days, following publication in the motor carriers' classification tariff.

The decision is significant. It is unlikely that railroads will stand by and watch cargo move by highway in drums that weigh less than those in which identical shipments sent by rail must be contained. Rail shipment of nonhazardous chemicals in the lighter drums is now authorized only for single-trip service. Packaging men expect that economic necessity will force rail carriers to follow the truckers' lead.

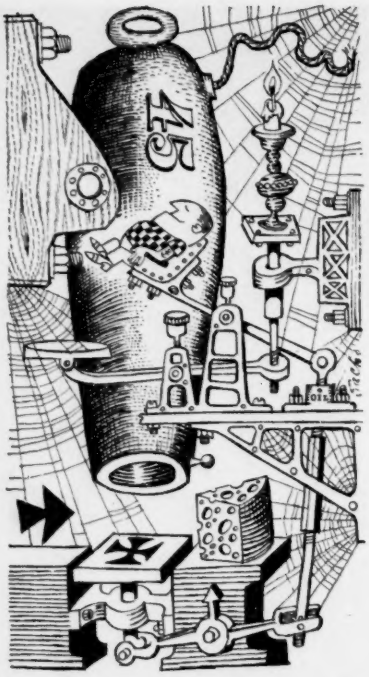
Full approval of the lighter drums will mean lower drum costs. The 20/18 drum will cost about 65¢ less than the 18/18 drum. Chemical companies now use between 8.3 and 10.4 million light- and heavy-gauge drums per year.

Chemical shippers are inclined to discount importance of the three-year time limit set by the motor carriers. The limit, they believe, is intended only to provide an easy means by which truckers may change their minds if the drums prove unsatisfactory in service. But test shipments conducted by the Manufacturing Chemists' Assn. and the Steel Shipping Container Institute strongly indicate that the lighter drums will prove successful.

Authorization of the light-gauge drums for general service has been bucked by the National Barrel and Drum Assn. Its grounds: the drums cannot stand frequent reconditionings. The 18/18 drum is more economical in multitrip service, claims NBDA.

NBDA, under the system of procedures used by the truck classification group, has a right to appeal. But, at the moment, NBDA has not made this decision.

Come what may, it's evident that



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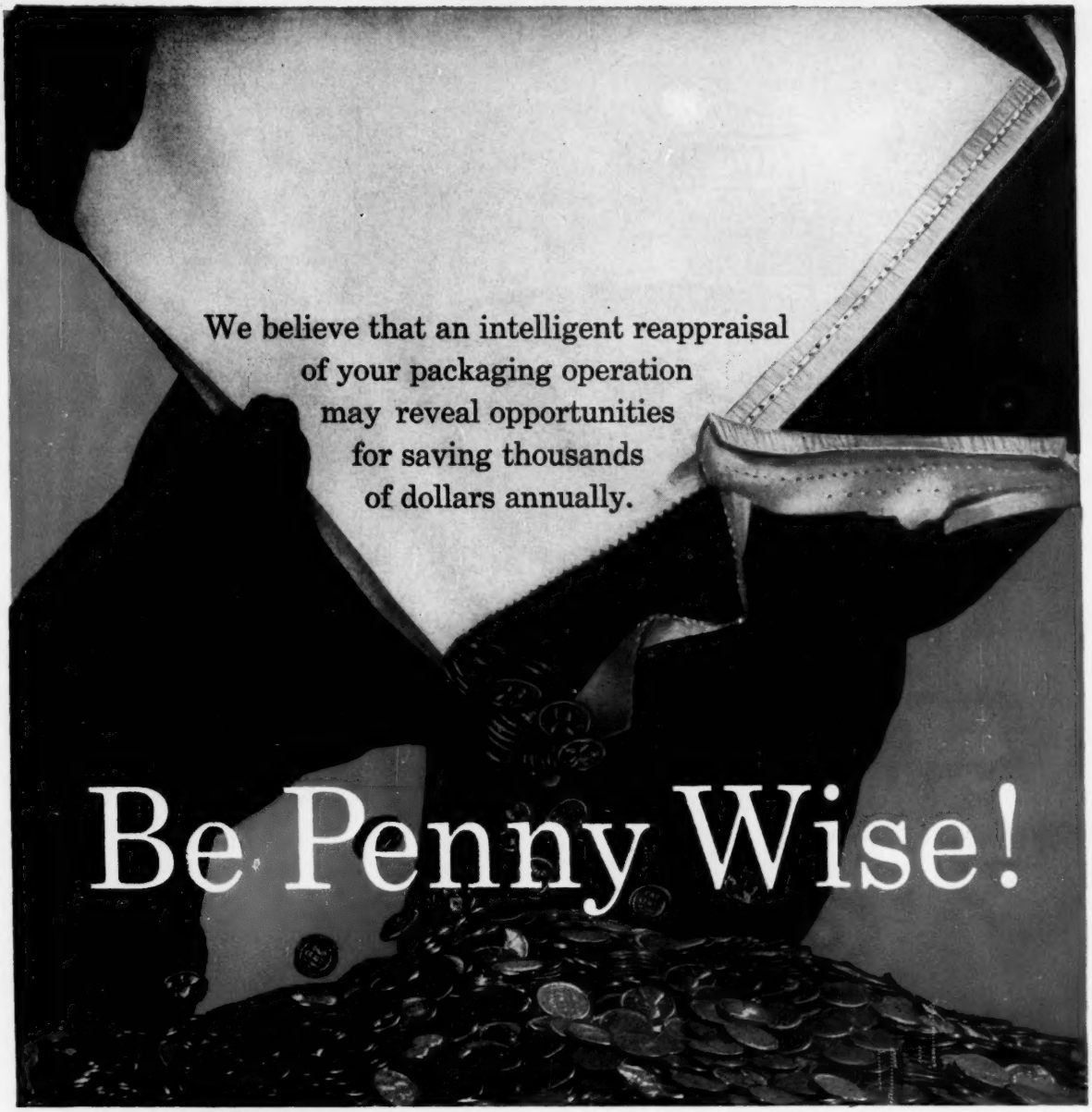
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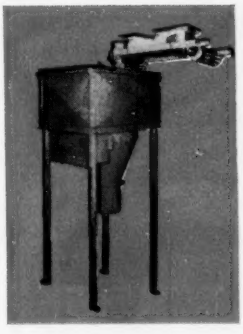
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the course of events favors the lighter drum, and that it's only a matter of months before chemical shippers will be able to put the 20/18's into multitrip service.

New Aid for Shippers

Shippers of liquid-chemicals are taking a look this week at brand-new additions to the literature on chemical tank trucking. National Tank Truck Carriers, Inc.* has just issued 35 "Commodity and Equipment Data Sheets." The data sheets give information about the characteristics of specific chemicals, suggest equipment, lining, loading, insulation, pumps, hose, tank-cleaning methods, handling, safety precautions and cleanup hints for each chemical.

The sheets, says NTTC, are edited to serve as worksheets for dispatchers, terminal managers, shop foremen and as guides in tank-purchasing decisions. Only one commodity is treated on each sheet.

The first 35 sheets cover these commodities: acids — acetic, hydrochloric, nitric, phosphoric, spent and sulfuric; also alcohol, anhydrous ammonia, ammonium nitrate solutions, asphalt, benzene, casinghead gasoline, caustic soda, formaldehyde, gasoline, glycerine, jet fuel, kerosene, latex, LP-gas, milk, molasses, nitrogen fertilizer solutions, crude oil, fuel oils (grades 2,3,4,5 and 6), lubricating oil, paint, phenol, synthetic resins, tallow, tar, toluene, trichloroethylene and varnish.

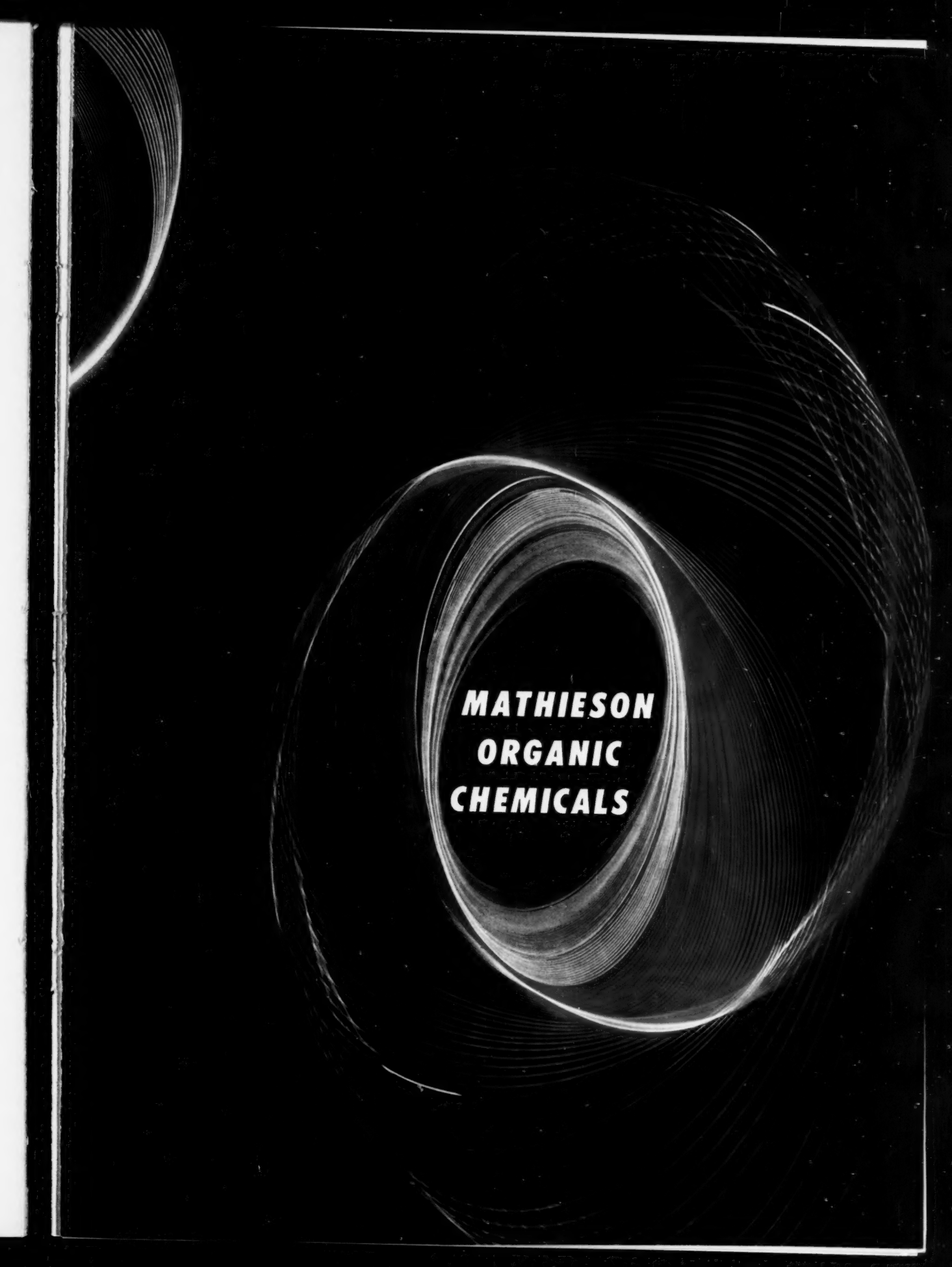
NTTC plans to issue a continuing series of sheets. Current and future sheets are priced at 25¢ each (minimum order $1.00); the complete current set sells for $5.

DATA DIGEST

• **Ethylene glycols:** 40-page brochure provides charts of physical properties, information about chemical properties, industrial applications, storage and handling, specifications and analytical procedures for mono-, di-, tri-, and tetra-ethylene glycol. Comprehensive bibliography lists 234 references. Jefferson Chemical Co. (Houston).

• **Metal degreasing:** New bulletin discusses methods of using emulsion cleaners in degreasing metals. L. Sonneborn Sons, Inc. (New York).

*1424 Sixteenth St., N.W., Washington 6, D. C.


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ETHYLENE OXIDE

Ethylene oxide is an important intermediate in the manufacture of ethylene glycol, polyethylene glycols, ethanolamines, nonionic surface-active agents and as a source of the hydroxy ethyl group in many compounds. It is also used as a sterilizing agent and as a fumigant.

Ethylene oxide is available in tank cars and 400 lb. returnable drums.

GLYCOLS

Ethylene Glycol

Ethylene glycol is the principal component of non-volatile antifreeze and engine coolants. It is also used in refrigerated cooling systems, deicing compounds, fire extinguishers and emulsion paints. Brake fluids and other hydraulic fluids are formulated with ethylene glycol to minimize rubber swelling. It is also used as a plasticizer and humectant for cellophane, paper, leather, adhesives and inks. As a chemical intermediate, it is used in making alkyd and polyester resins and non-freezing industrial explosives.

Ethylene glycol is available in tank cars, tank trucks and 55 gallon drums (510 lbs. net).

Diethylene Glycol

As a chemical intermediate, diethylene glycol is used in the manufacture of plasticizers and resins. Due to its high hygroscopicity and low vapor pressure, diethylene glycol is used as a dessicant for gas dehydration and as a humectant for conditioning fibers, tobacco, composition cork, cellophane and synthetic sponges. It is also used in steam set inks as a solvent and humectant.

Diethylene glycol is available in tank cars, tank trucks and 55 gallon drums (520 lbs. net).

Triethylene Glycol

Triethylene glycol is a good liquid dessicant and is used in many gas dehydration processes, including air-conditioning systems. As a plasticizer-humectant, it imparts flexibility and prevents shrinking in composition cork. It is also used as a chemical intermediate in the manufacture of esters which are used as resin plasticizers, and ethers which are valuable in formulating dispersing, wetting, cleansing and softening agents for textile processing.

Triethylene glycol is available in tank cars, tank trucks and 55 gallon drums (520 lbs. net).

POLYETHYLENE GLYCOLS (POLY-G'S)

Poly-G 200, 300, 400 and 600 are clear, odorless, viscous liquids which are soluble in water, acetone, ethanol, ethyl acetate and toluene. Poly-G 1000, 1500 and B1530 are white waxy materials having slightly less water solubility than the lower members of the series. The average molecular weight is indicated by the specific series number, except in the case of Poly-G B1530 which is a selected blend of Poly-G 1500 and 300. The Poly-G's can be blended with themselves or other materials, to form products having specific physical properties.

In the textile and leather industries, Poly-G's and their fatty acid derivatives are used as emulsifiers, lubricants, anti-static agents, pigment dispersants and softeners. The humectant properties of the Poly-G's are also used for paper softening and moisture control in steam set inks. Cosmetic and pharmaceutical ointment preparations use Poly-G's because of their compatibility with other components and their low order of toxicity. The Poly-G's are also used as chemical intermediates in the manufacture of surfactants, plasticizers and resins.

The Poly-G's are available in tank cars, tank trucks and 55 gallon drums (500 lbs. net).

ETHANOLAMINES

Monoethanolamine, Diethanolamine and Triethanolamine are bifunctional due to the presence of both an active amine and hydroxyl group. They are used extensively for removing hydrogen sulfide and carbon dioxide from natural gases, refinery gases and synthesis gases such as are encountered in ammonia manufacture. A variety of detergents, emulsifiers, wetting agents and foam stabilizers are made from the ethanolamines. These surfactants are used in formulating many household and industrial products. They are also used as textile and leather processing agents. The ethanolamines are used as corrosion inhibitors, rubber processing agents, demulsifying agents for petroleum emulsions, dispersing agents in mortar and concrete, and as chemical intermediates for pharmaceutical and other chemicals.

The ethanolamines are available in tank cars, tank trucks and 55 gallon drums.

GLYCOL ETHERS (POLY-SOLV'S)

The Poly-Solv's are clear odorless liquids. They contain both an ether and an alcohol group and therefore are strong solvents for a variety of substances. The Poly-Solv's are miscible with water and most organic solvents and are powerful solvents for other organics such as nitrocellulose, cellulose acetate, ethyl cellulose, shellac and Kauri gum. They are effective mutual solvents or coupling agents and, as such, are used in formulated cleaners, dry-cleaning soaps, insecticides and cutting oils. **Poly-Solv EM** is used as a medium-boiling solvent for nitrocellulose, for sealing moisture-proof cellophane and as an aid in obtaining dye penetration in acetate rayon fibers. **Poly-Solv EE** is widely used as a solvent in nitrocellulose lacquers to give higher gloss and improved flow-out. It is an excellent solvent for alkyd and phenolic resins, naphthol dyes, reduced vat dyes and plasticizers. **Poly-Solv EB** is an effective solvent for many resins. When used as a solvent in lacquers, it slows rate of evaporation, strengthens blush resistance and improves flow-out, leveling and gloss. **Poly-Solv DM** is used in brake fluid formulations, brushing lacquers, spirit-type stamp-pad ink dyes and textile dye pastes. **Poly-Solv DE** is used as a diluent in both light and heavy duty brake fluids and in non-grain raising wood stains. It is also used in industrial cleaning formulations as a fast acting mutual solvent. **Poly-Solv DB** is valuable as a solvent for use in lacquers where a very low evaporation rate is required. It is also used as a solvent in inks and for vinyl chloride resins and as an effective mutual solvent in soaps.

Poly-Solv D2M, the dimethyl ether of diethylene glycol, is a unique solvent. It serves as an anhydrous reaction medium for alkylations, ester self-condensations, mixed ester condensations and reductions in which metal hydrides and borohydrides are used.

The Poly-Solv's are available in tank cars, tank trucks and 55 gallon drums. **Poly-Solv D2M** is available in 55 gallon drums only.

SURFACTANTS (POLY-TERGENTS)

The Poly-Tergents are nonionic surface-active agents. They are water white to pale yellow liquids with a slightly aromatic odor, and are used chiefly as detergents, dispersants, emulsifiers and wetting agents. Chemically, the "B" and "G" series are ethoxylated nonyl and octyl phenols and the "J" series are ethoxylated tridecyl alcohols. The "J" series are offered as 85% aqueous solutions while the others are concentrated products. The Poly-Tergents are effective over a wide range of temperatures as indicated by their cloud points which range from 0° to 100°C.

The Poly-Tergents are effective in many industrial applications. They have found wide acceptance in the textile industry for scouring wool, cotton and synthetics, including neutral wool scouring; "soaping-off" after printing and dyeing; and in bleaching, dyeing and desizing operations. In the pulp and paper industry the Poly-Tergents are used as rewetting agents and deinking aids as well as for pitch control and felt washing. They are also used as emulsifiers and dispersants in water-base paints. Other industrial applications include pesticide concentrate formulations, metal cleaning and pickling, petroleum demulsification, leather degreasing and fat liquoring, and many others.

The Poly-Tergents are available in tank cars, tank trucks and 55 gallon drums (460 lbs. net).

ETHYLENE DICHLORIDE

Ethylene dichloride is a solvent for fats, oils, waxes, rubber, unvulcanized rubber, camphor, resins and gums. It may be used in the extraction of edible oils, vitamins from fish-liver oils and nicotine from tobacco. It is employed in fumigant mixtures for furniture, furs, cereals, grains, flour, dried fruit and nuts.

Ethylene dichloride is available in tank cars, tank trucks and 55 gallon drums (570 lbs. net).

DICHLOROETHYLETHER

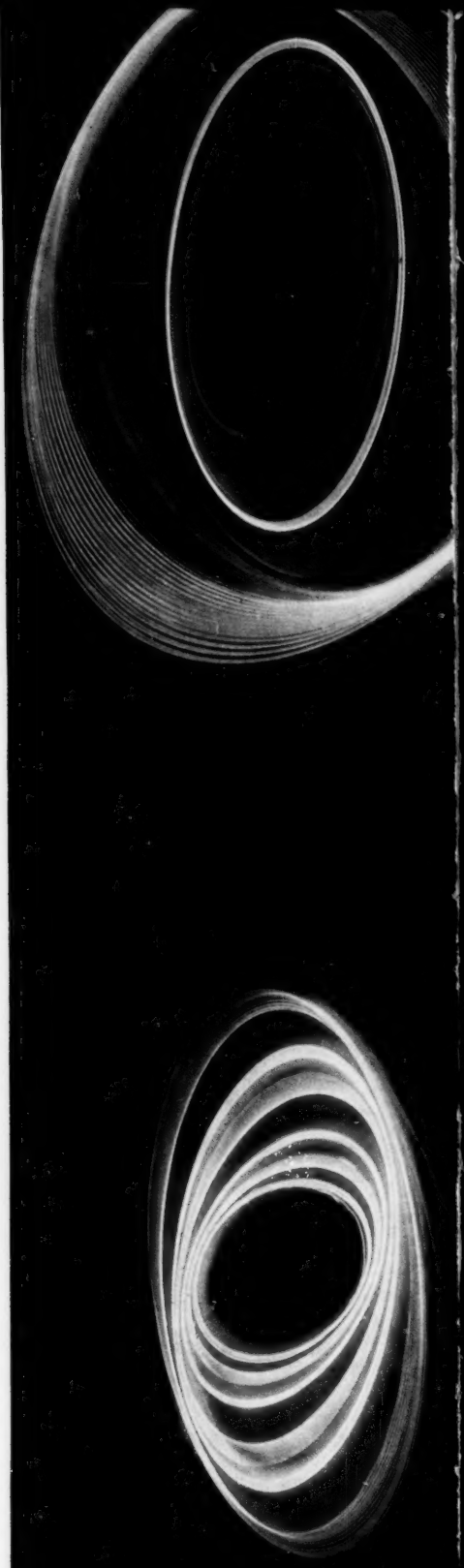
Dichloroethylether is an excellent solvent for oils, fats, waxes, gums, tars, natural and synthetic resins, soaps and ethyl cellulose. It acts as a cleaning agent in the removal of paint, tar, varnish, oil and grease. The textile industry employs dichloroethylether where a softening, conditioning and penetrating agent is required. In addition to these functions of dichloroethylether, it is used as a soil fumigant.

Dichloroethylether is available in tank cars, tank trucks and 55 gallon drums (550 lbs. net).

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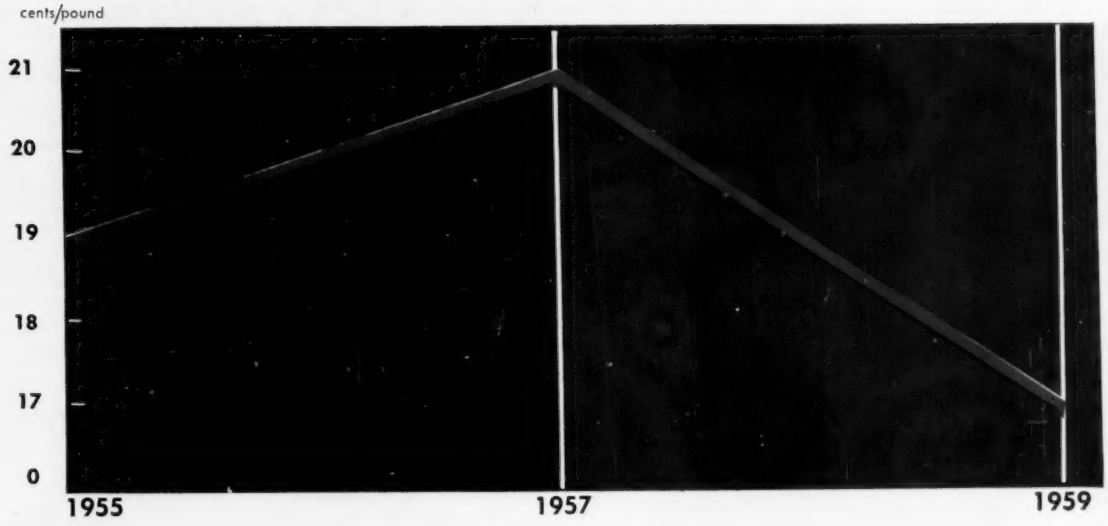
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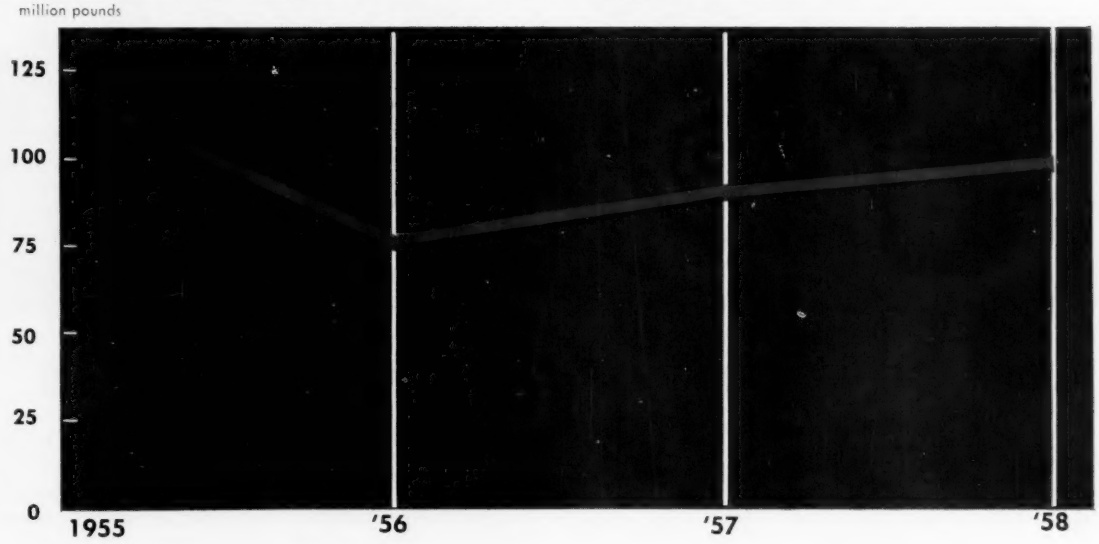
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1-Phthalic Anhydride Price Cut and...



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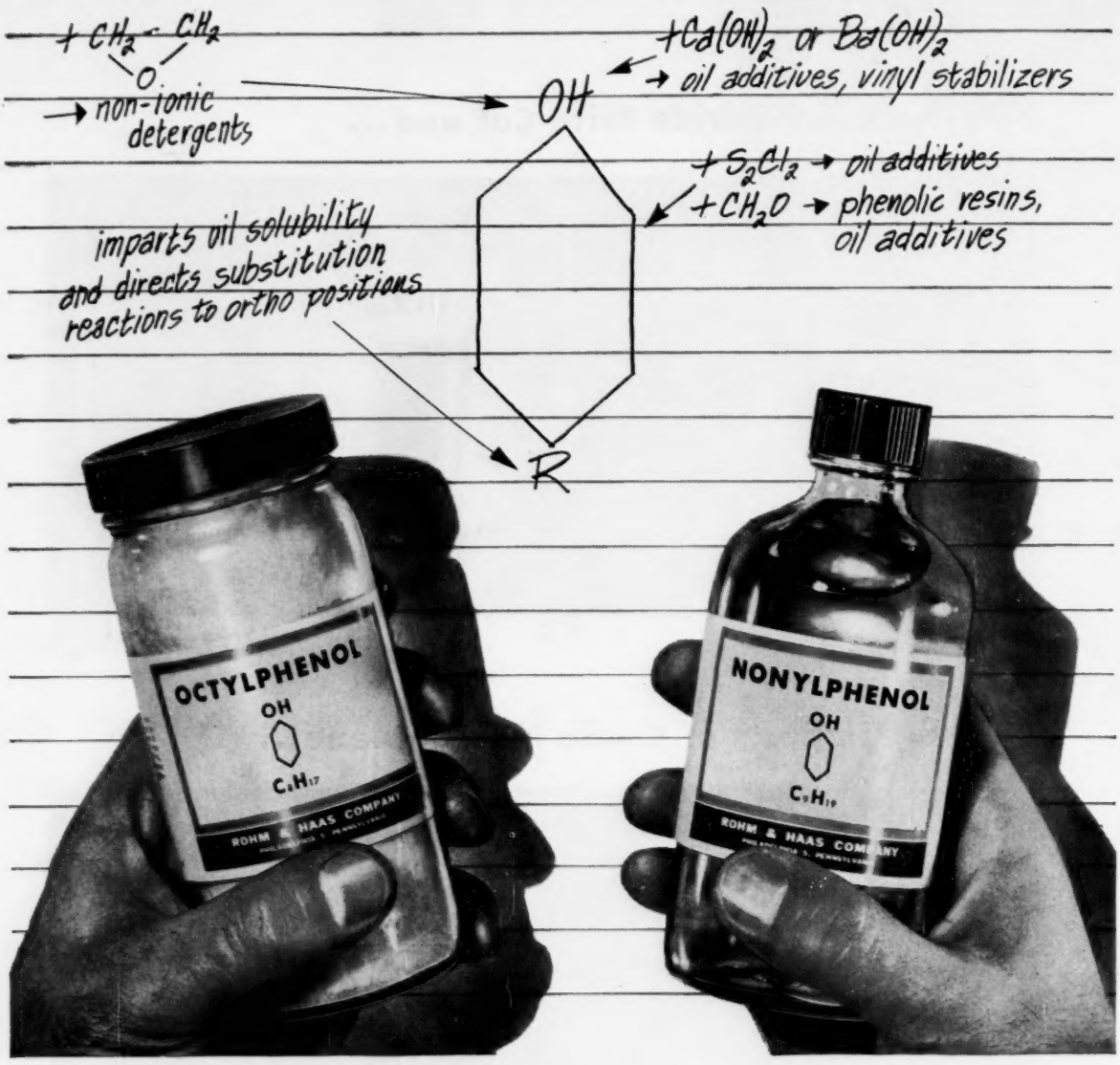


Double Trouble for Naphthalene Makers

U.S. naphthalene marketers are this week debating the significant question: "Will there be a price cut soon?" The question comes as a direct result of the current shaky phthalic anhydride market situation.

Phthalic anhydride enters the picture because some 83% of crude naphthalene goes for manufacture of the anhydride. And just a few weeks ago, Amoco Chemical solicited phthalic anhydride business at 17¢/lb.—a fat 4¢/lb. less than the present price (*CW Market Newsletter, Aug. 2*). Further, Amoco uses xylene, not naphthalene, as a starting compound.

But more than that underlies the naphthalene makers' dilemma. Imports of crude naphthalene, priced at 2-3¢/lb. less than domestic material, will likely hit 100 million lbs. by the



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When used in small proportions, alkylphenols impart oil solubility, water resistance, and good electrical properties to phenol-formaldehyde resins. Excellent lubricating oil additives and vinyl stabilizers are obtained from calcium and barium salts of alkylphenol derivatives. Ethoxylated alkylphenols are good surface-active agents. Octylphenol is used to stabilize ethyl cellulose against ultraviolet light deterioration.

Interesting possibilities are also offered by the use of alkylphenols as intermediates in the preparation of fungicides, bactericides, insecticides, dyestuffs, pharmaceutical compounds and rubber chemicals.

Rohm & Haas would be pleased to send you without obligation a 12-page booklet describing numerous alkylphenol reactions.

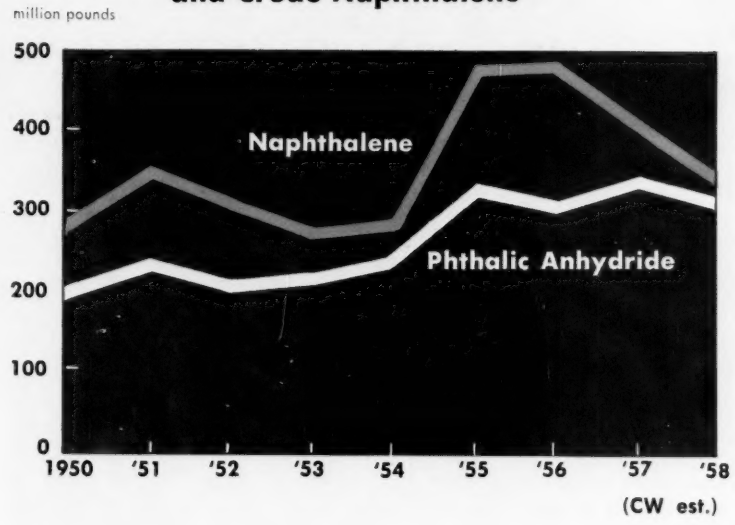
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Representatives in principal foreign countries

U.S. Output of Phthalic Anhydride and Crude Naphthalene



end of this year. This would be the third-highest annual importation on record.

Price Cut Ruckus: Even without the import problem, Amoco's 20% lower phthalic anhydride prices would likely cause trouble. The move caught naphthalene and phthalic anhydride producers off guard, and stirred up a pocket-size storm within the industry. At first, it was thought that when Amoco starts delivering at these lowered prices, a split price situation might prevail. This was because Amoco could supply only about 4% of total U.S. need, might be coming onstream with possibly troublesome new equipment, production methods.

Now, however, many observers doubt that there will be two prices. Several producers of naphthalene-derived phthalic admit having notified customers that Amoco's lower prices —when they come—will be met.

It is this new stand, taken by established phthalic makers, that swings the spotlight toward phthalic's traditional raw material—naphthalene.

Production Down, Imports Up: Domestic output of crude naphthalene in '58 is expected to be about 350 million lbs., or 29% less than the record 491-million-lbs. output in '56. Two years ago, a stepped-up steel output (prime source of naphthalene), plus some ill-advised predictions of a naphthalene shortage, and a leveling off of imports, propelled domestic production far beyond subsequent demand. Naphthalene inventories in '56 were the highest on record.

Contrary to some expectations, naphthalene imports have been gaining momentum. After a slump to some 79 million lbs. in '56 (from a record mark of 121 million lbs. in '55), imports have again started to climb, will hit some 100 million lbs. this year.

Foreign Dilemma: Meanwhile, market followers are keeping close tabs on foreign phthalic production, which could affect U.S. naphthalene imports.

At present, western Europe's phthalic anhydride capacity is pegged at some 300 million lbs., with an additional 100-million-lbs. capacity planned for completion before '60. West Germany—largest shipper of crude naphthalene to the U.S.—has more than 100 million lbs. of present West European capacity.

U.S. observers are hoping that when the new European phthalic anhydride capacity is onstream, much of the excess naphthalene now shunted to the U.S. will be consumed at home. But it is perhaps more realistic to take the less-optimistic viewpoint that European nations will simply increase naphthalene recovery from coal—at present much lower, on a unit basis, than is the U.S. recovery rate—to provide



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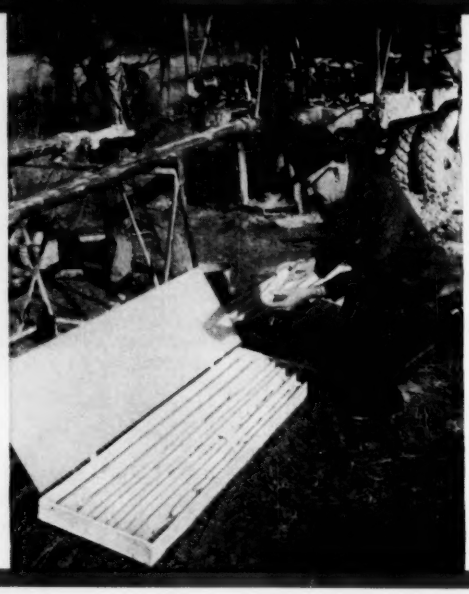
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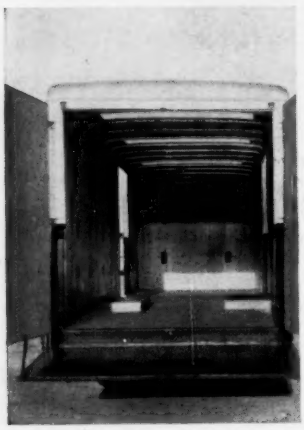
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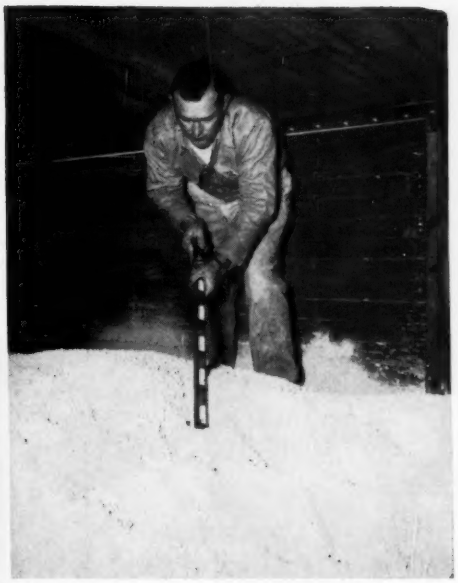
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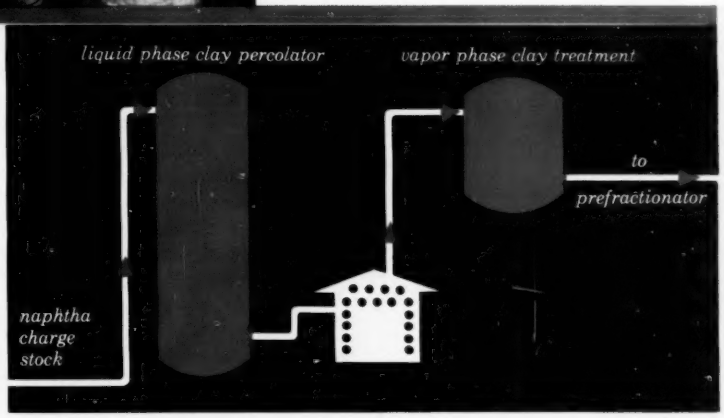
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There's obviously no assurance that naphthalene imports will decline because of foreign phthalic production. But there is a chance that U.S. phthalic anhydride exports—a healthy 23 million lbs. in '57—may be cut back.

Capacity Up, Demand Down: U.S. phthalic anhydride capacity by the end of '59 will hit some 490 million lbs./year. If isophthalic and other isomers are included, total U.S. capacity for these related materials will nudge some 600 million lbs./year.

Output of phthalic anhydride is expected to slide this year to some 320 million lbs., down 35 million lbs.

Producers Stand Firm: The reasons are plain why makers of naphthalene are being pressured to lower prices. But they're resisting.

Explains one producer: lowered steel output and the blotting up of some inventories has put the naphthalene supply situation into better balance with demand. "We're going to sit tight," he says, "and see what happens with the phthalic situation. Amoco has too small a share of the market to be able to knock prices apart. We're operating at such a tight profit margin, as it is, that any lowering of naphthalene or phthalic prices is going to create chaos."

Naphthalene buyers, as expected, feel that if phthalic anhydride prices go down, naphthalene prices will have to follow suit to meet production costs. The buyers stress the point that, historically, the price of naphthalene has been about one-third of phthalic prices. The present 7¢/lb. price for naphthalene and expected 17¢/lb. for phthalic would be far out of line.

The "rights" and the "wrongs" of the price question will probably be hotly debated to the moment actual market conditions force a decision.

Broadening Brimstone Battle

All but lost in the glare of U.S.-Mexican battle for world sulfur markets is the steady growth of Canada's sulfur industry. But its potential impact on U.S. producers is now becoming plainer.

Just last month, for example, Jefferson Lake Petrochemical of Canada quietly started shipments of sulfur from its new plant at Taylor, British Columbia, to Canadian pulp and paper mills that used to buy U.S. material. Jefferson spokesmen say some 40,000 tons of sulfur are now available; the firm's $2.25-million, 425-tons/day capacity installation will ultimately extract an estimated 2 million tons of sulfur reserves from hydrogen sulfide contained in natural gas.

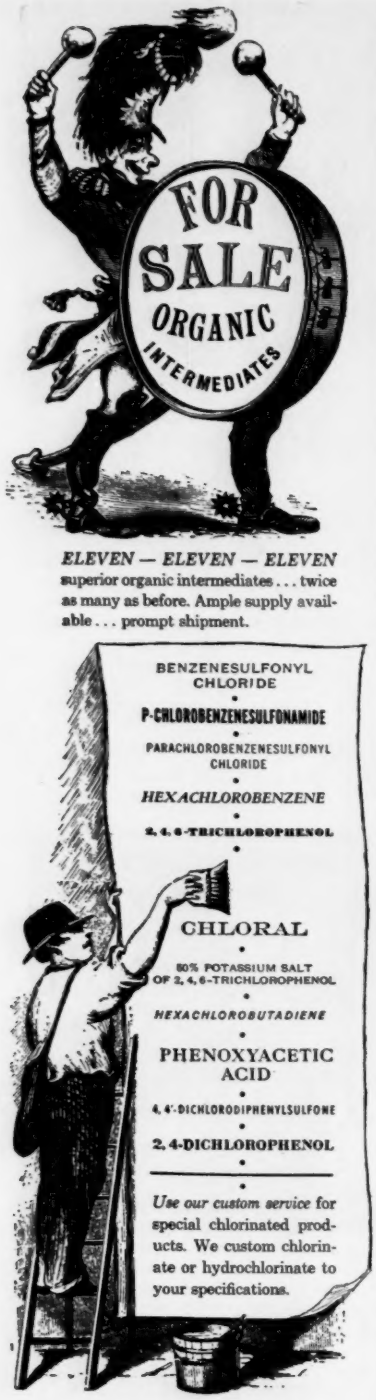
And loss of Canadian markets isn't the only U.S. worry. Because most of the new sulfur output will be barged to B.C. and Puget Sound ports, better bulk terminals in Vancouver Harbor are needed—terminal facilities that within two years will be used to carry out Jefferson's plan to start overseas shipments of sulfur. At that time, large sulfur gas reserves in Alberta will be in production. Shipments abroad will go primarily to Australia, New Zealand, Japan, Korea and India. Of course, cost of rail shipments to Vancouver must also be considered.

Jefferson's 80,000 acres of gas leases near Calgary, Alberta, have proved sulfur reserves of about 7 million tons. Hence another large sulfur producing plant will likely be installed near Calgary within two years. Expected capacity is more than 500 tons/day.

Mexican Impact: Meanwhile development of Mexican sulfur proceeds at a far more dramatic pace, and new producers may be coming in soon (*CW, Aug. 30, p. 59*). Mexico's emergence as a major sulfur producer and exporter is recognized by the U.S. Bureau of Mines as a highlight of '57 sulfur events.

In its just-released '57 sulfur report, USBM notes that U.S. imports of elemental sulfur increased from 212,229 tons in '56 to 495,668 tons in '57, mostly from Mexico. U.S. sulfur exports declined slightly below the 1.6 million tons reported for '56 as world demand for U.S. Frasch sulfur "was modified" by Mexican sulfur.

During '57, U.S. sulfur output in all forms totaled a little more than 7 million long tons; 80% was Frasch sulfur, 7% recovered material, 6% sulfur contained in pyrites, 6% in smelter acid, 1% in other forms. Compared with '56, Frasch sulfur declined 15% while output of sulfur recovered as by-product in purification of natural, industrial gases increased 10%.



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New Building Method Build Sales for Sealants

Makers of specialty sealing compounds—versatile mastic fillers used where conventional materials won't work—have a special interest in America's changing architecture. "Curtain-wall" construction has taken over the commercial building field and, in doing so, has boosted specialty sealants from little-known items to important construction materials with $10-million/-year sales, $4 million to the building industry alone.

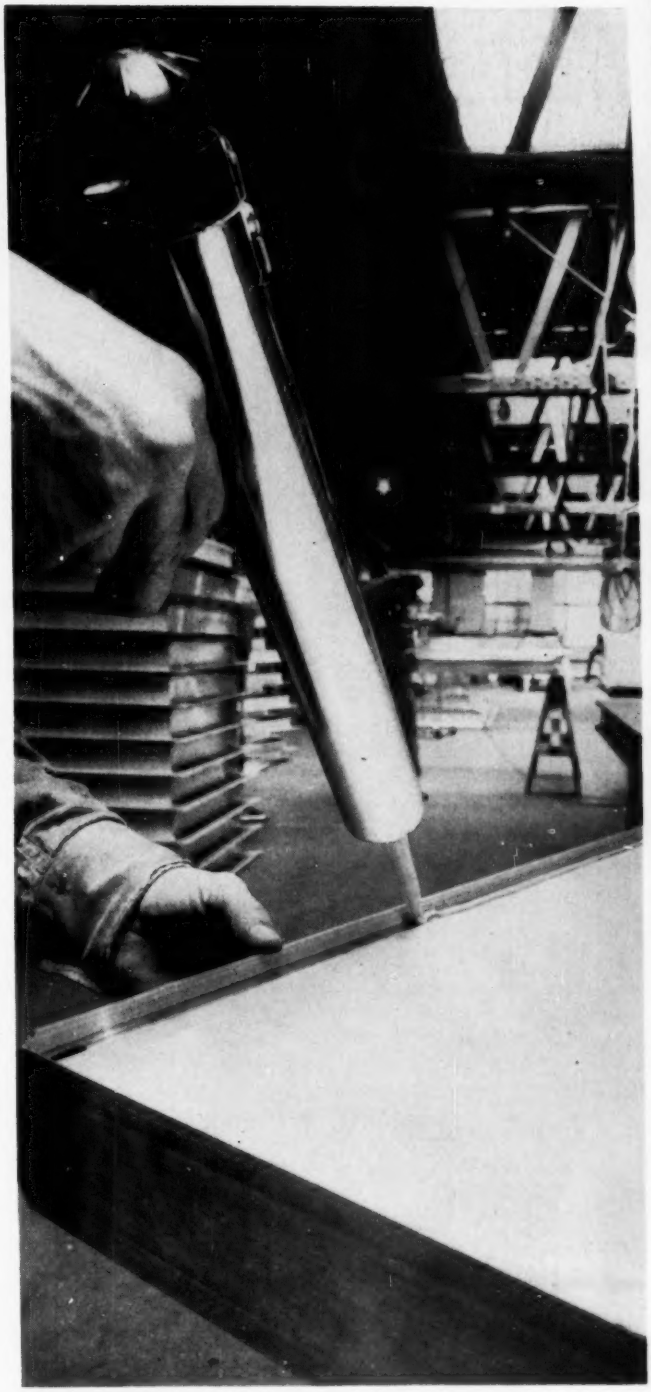
This month, for example, specialty sealants will be ordered for two of Manhattan's now-building skyscrapers—the Union Carbide building and the Chase Manhattan Bank. As is the rule on such curtain-wall structures, the sealants will be used to plug joints between the individual metal and glass panels that are used in place of masonry walls. Just how much sealant these buildings will require isn't known yet, but it will be a sizable amount. New York's recently completed Seagram building, for example, used 550 gal. of polysulfide sealants; Lever House, about 1,000 gal. Requirements like these have helped double the architectural sales of the sealants every year since '55, a growth pace that will not slacken in '58.

Two main types of sealants are now favored: the polysulfide type, applied generally with a caulking gun (this type is specified by Carbide) and the prefabricated solid neoprene gaskets. Specialties makers are plugging for the polysulfides, since Du Pont's neoprene (polychloroprene) gasket is generally made by rubber fabricators, while the putty-like polysulfides are turned out by a host of specialty formulators.
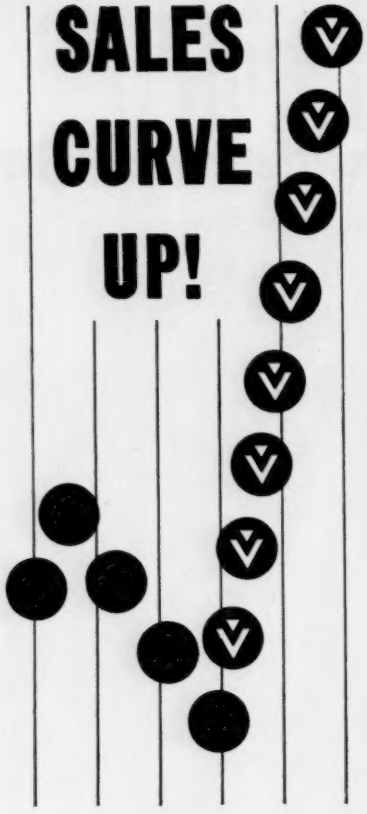
Soaring Sealants: So far, the specialties makers have been successful in their sales drive—well over 50% of sealants now used in curtain-wall expansion joints are compounds based on polysulfides. Sales of sealants for building purposes are expected to hit over $4 million this year, and their sales potential is brighter here than in any other field of application.

As the sale of sealants to builders booms, a major change in the over-all sealant sales pattern becomes apparent. The aircraft industry is still number-one user of the compounds—$5 million worth will be used in '58 to leak-proof integral wing tanks, pressurized cabins, and for potting electrical components, in addition to other specialty uses. Another $1 million worth will be purchased by the marine industry for applications such as deck caulking. But the building industry, with its expected '58 sales of $4 million, is expected to overhaul the aircraft industry soon as prime user.

Builders' Choice: Because the thin panels used in curtain walls are very susceptible to temperature changes and deflection under wind load, conventional caulking and glazing compounds (mixtures of linseed oil, synthetic drying oils or hydrocarbon oils plus inert



Caulking joints between curtain-wall panels will require $4 million worth of sealants this year.



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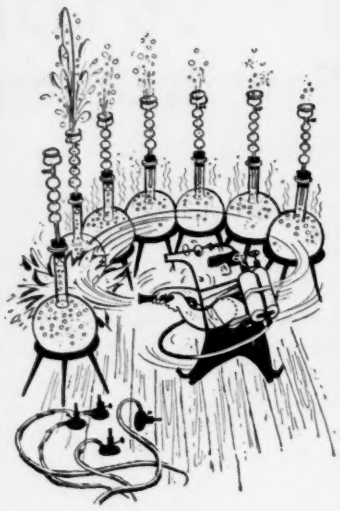
fillers) don't stand up in curtain-wall joints. These materials dry out, have inferior adhesion characteristics compared to the polysulfides and won't expand and contract with the curtain wall. Principle advantage of the polysulfides is their good sealing action, which is due to high adhesion and cohesion as well as elasticity. Furthermore, they are practically unaffected by weather, don't gather dust or dirt and expand with the wall.

The majority of polysulfide sealants are sold as a two-component system, to be mixed on the job. One package contains the polysulfide liquid polymer, fillers (carbonates, silicates) and other additives, in the form of a viscous paste; the other package contains the curing agent, usually lead peroxide. In some areas, suppliers furnish the compound premixed and frozen. Polysulfides are almost always applied with a caulking gun, have a pot-life of three to eight hours.

Although most caulking contractors questioned by *CW* feel that the polysulfides are the best answer to curtain-wall joints to date, they noted a few drawbacks. Polysulfides, at $15-$20/gal. are costly—a gallon fills a seam ½″ x ⅜ x 102′. Also, they have a limited pot-life, and must be mixed carefully.

Sealant makers say these problems are only temporary, however. Research is under way to develop a polysulfide with an extended pot-life. The new products will depend on atmospheric oxygen as the curing agent and will come in one package, ready-to-use. Companies now working on a one-package polysulfide say that it will be at least another year before it's ready for the market. As for the price, it's not likely to drop much in the next two to three years, because of the cost of the polymer.

Sealant Makers: Thiokol Chemical Corp. (Trenton, N.J.), holds the patents in the polysulfide sealant field, makes the basic material and sells it to some 20 formulators. Some leading formulators of polysulfide sealants are Minnesota Mining and Manufacturing Co. (St. Paul); Products Research Co. (Los Angeles); A. C. Horn (New York); Coast Pro-Seal Mfg. Co. (Los Angeles); Pecora Paint Co. Inc.. (Philadelphia); Presstite Keystone (St. Louis); Tremco Manufacturing Co. (Cleveland); and D. E. Long (New York).



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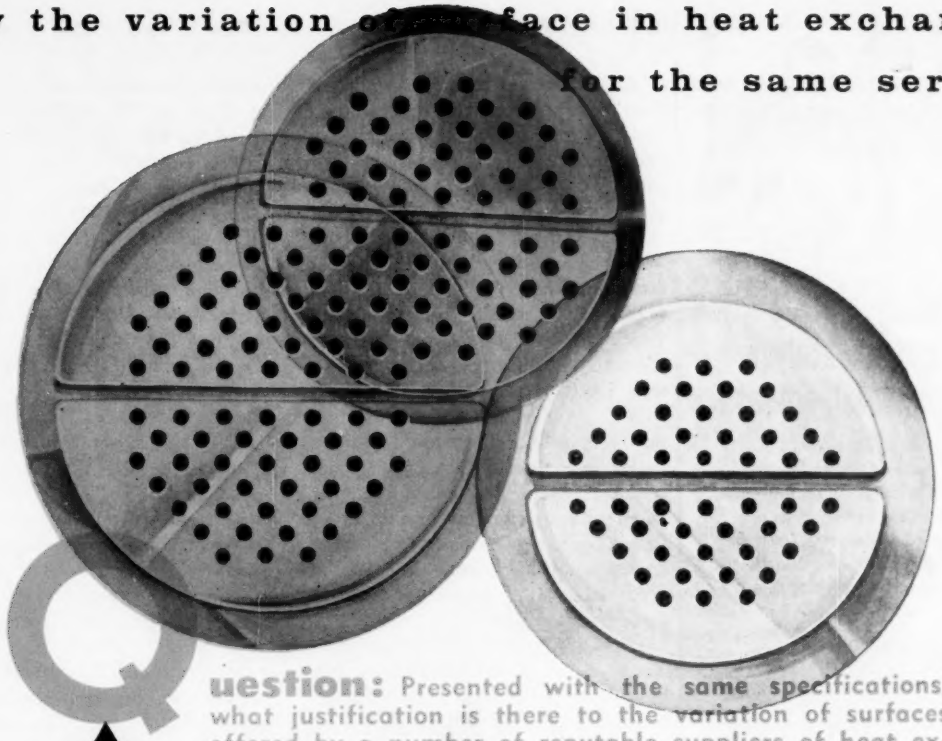
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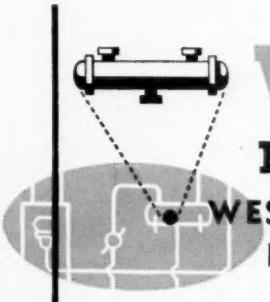
Question: Presented with the same specifications, what justification is there to the variation of surfaces offered by a number of reputable suppliers of heat exchanger equipment, for a given service?

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The companies market the bulk of their sealant materials direct (80%) and sell the remaining 20% through construction jobbers. About 75% of polysulfides for the building industry go into new buildings, and the rest for repair of old buildings where conventional caulking and/or glazing compounds have failed.

Stiff Competition: Neoprene, Du Pont's synthetic rubber, is polysulfide's biggest competitor for sealing curtain-wall joints. Neoprene is a resilient gasket, not a mastic sealant, and depends upon flexibility and elasticity under compression for its sealing action. As contrasted with polysulfide, neoprene comes premolded and is designed on a custom basis for specific application. Consequently, its performance depends to a great extent on meticulous design.

Like the polysulfides, neoprene stands up well under temperature and moisture changes, and expands and contracts with the curtain wall. But, on the other hand, neoprene has poor light-color retention, black being the only serviceable color. However, Du Pont recently began offering neoprene coated with Hypalon (a chlorosulfonated polyethylene) and this, reportedly, upgrades color properties.

Biggest advantage of neoprene is its low cost. According to Du Pont, neoprene compression seals will save up to 50% on the installed cost, compared to the polysulfides. Neoprene gaskets now sell for about 16¢/ft. Because of its low cost, it's occasionally used with polysulfide as a backing to fill large voids in curtain-wall joints.

Companies now offering commercial neoprene sealants are Pawling Rubber Corp. (Pawling, N.Y.); Inland Manufacturing Division of General Motors (Dayton, Ohio) and Industrial Rubber Goods Co. (St. Joseph, Mich.). Du Pont reports that nine other companies are seriously considering or just getting into the neoprene resilient gasket field.

Although neoprene gaskets and polysulfide have by far the bulk of the curtain-wall sealing market now, there are many other products on the market and many more in the research stage. Mastic products now available include extruded butyl-base tapes and polybutenes. Big drawback of polybutenes is that they collect dirt and grease, remain permanently tacky and require compressive confinement for effective sealing. Butyl tapes have these same drawbacks but to a lesser extent.

Research is under way on the urethane compounds (these show good weatherability but poor elongation), the silicones (these stand up well but are too expensive—$40/gallon at the manufacturer's level) and the neoprene putties. Goodrich has just marketed a mastic sealant with a neoprene base, which it says is less expensive and easier to work with than the polysulfides.

Competing with resilient neoprene molded strips are those made of polyvinyl chlorides. They are being used only in limited amounts for curtain-wall expansion joints. Their chief drawback is that PVC, a thermoplastic, doesn't stand up under severe temperature changes.

Other compounds in the resilient field include GR-S rubber (butadiene-styrene copolymers), butyl rubber (isobutylene-isoprene copolymers) and natural rubber (*cis*-isoprene polymers). They are said to have good color retention, but poor resistance to oil and weather.

Although many companies are looking at a wide range of products for sealing curtain-wall joints, the number of companies to actually enter the field and remain is likely to continue

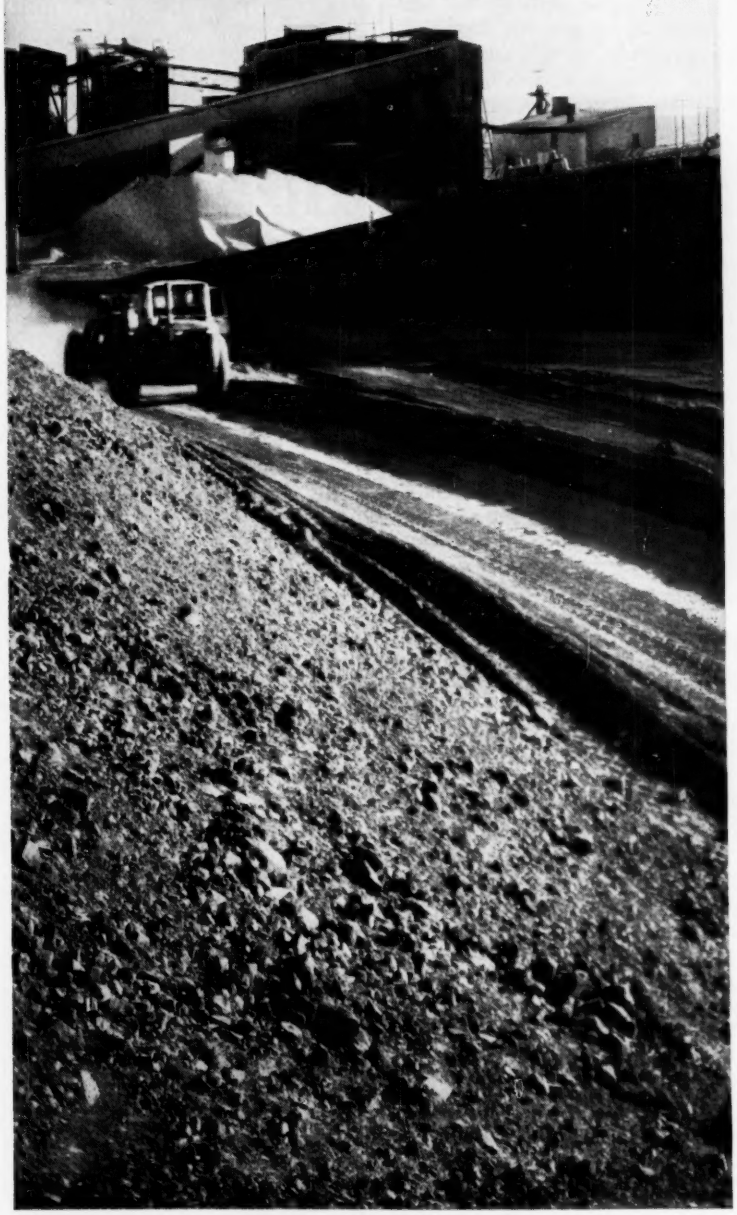
Mastics Defined

Here is a clarification of terms for the different types of mastic filling compounds used in the construction industry:

- **A caulking compound** is a heavy paste with 75-95% solids content, usually used to fill a hole such as is found between sash and brick. Less viscous than glazing compounds, caulking compounds can be applied with a caulking "gun". They are sometimes called sealants.
- **A glazing compound** (example: putty) is a soft cement usually used for setting glass. Percentage of solids: 95-100%.
- **Sealants** is a term for mastic fillers, limited to those that stand up well in expansion joints, i.e., expand and contract with the curtain wall, are resistant to weather. Resilient-type gaskets, such as made with neoprene and polyvinyl-chloride, come premolded, and, because they support weight, are considered as engineering components, not chemical specialties.

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SPECIALTIES

small. As an accepted form of U.S. architecture, curtain-wall construction is less than a decade old. The market is still uncertain and there are plenty of problems yet to be solved. For example, there is a question of liability where a sealed building leaks. Does the responsibility rest with the maker of the sealant, the applier, the building contractor or the architect?

In any case, curtain-wall construction seems sure to grow in popularity, and makers of sealants are sure to cash in on bigger sales. Contruction industry estimates show that over 20-million sq. ft. of paneling will go into curtain walls this year; in the next five years, that figure will double. If these estimates pan out, sale of sealants for curtain-wall joints will rise as high as the skyscrapers that they're used in.

PRODUCTS

Heat-Resistant Hydraulic Fluid: Dow Corning Corp. (Midland, Mich.) has a new synthetic, an alkyl silane, which, it feels, holds promise as a hydraulic fluid for closed systems. It is said to be useful over the range of —25 F to 550 F for long periods; withstand 700 F for short ones. In addition to its application as a hydraulic fluid, the material also shows promise as a base for high-temperature turbine lubricants. Called QF-6-7009, the product is the first commercially available diphenyldidodecylsilane fluid.

•

Instant Acid: Enth-Acid 82, a powdered replacement for liquid acids has been introduced by Enthone, Inc. (New Haven, Conn.). The product is a blend of acid salts, activators and surfactants. Solutions are prepared by dissolving 4 oz. to 3 lbs. free-flowing salts per gallon of water. Applications include activating iron, steel, brass, copper or zinc-base die-castings prior to plating.

•

Veterinary Skin Drug: Jensen-Salsbery (Kansas City, Mo.) has come out with a new sulfur compound for animal skin disorders. Tradenamed Thionium, it's claimed to be the first vet product in which polythionic acid has been used.

Thionium is recommended for nonspecific dermatoses, seborrheic dermatoses, eczemas, and other fungal skin infections.

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4. Drilling Mud	Emulsifying Agent for Oil	Surface Tension Depressant
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7. Printing Ink Manufacture	Aids Dispersion of Pigment	Reduces Viscosity of Ink
8. Ore Flotation	Flotation Reagent	Selective Wetting Agent
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11. Emulsifiable Solvent Cleaners	Dispersing Agent for Oil and Grease Deposits	Acts as Emulsifying Agent
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13. Fat Splitting Process	Dispersing Agent for Solid Fats	Acts as Wetting Agent
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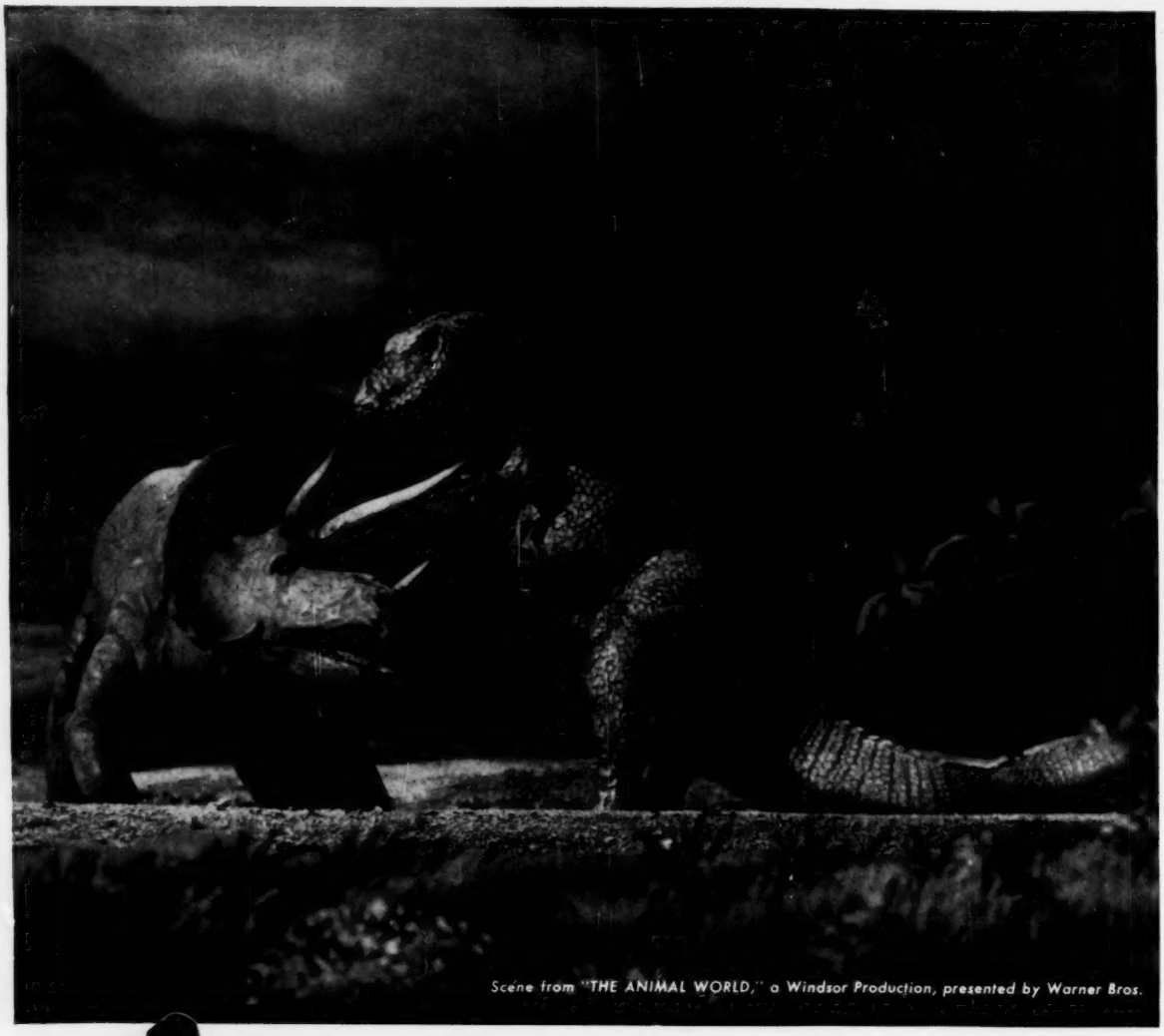
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Technology
Newsletter

CHEMICAL WEEK
September 13, 1958

Use of cobalt-60 to produce synthetic detergents from paraffins instead of aromatics has been tried experimentally by Esso Research and Engineering Co. The radiation causes reaction of sulfur dioxide and oxygen with the liquid paraffins, resulting in new classes of detergent materials. A main goal of the experiments is to produce paraffinic detergents that are less expensive than those made from aromatics (benzene, toluene, etc.), as are many currently available syndets. Also, the nuclear technique promises to provide better control over end-products than the other commonly used process, which involves treatment of lubricating oil stocks with sulfuric acid.

Cost of the new process is expected to be competitive with existing commercial methods, since gamma rays from the cobalt-60 are required only to trigger the reaction. Furthermore, there is reportedly no danger of product contamination because the rays do not make other objects radioactive.

•

Chemical industry research budgets are up 10% this year over last, according to a new American Management Assn. survey. Eighteen of 24 industries reported research and development budget gains ranging from 2% to 26%. Biggest research loser: construction machinery—off 15%.

•

Highlights of American Chemical Society's 134th national meeting in Chicago this week include these drug developments:

• Two potential antileukemia drugs—5-bis (2′-chloroethyl) aminouracil and N-*p*-bis- (2-iodoethyl) amino benzylphosphonate—reported by Upjohn researchers; and another, diepoxybipiperidyl, disclosed by Eli Lilly. All compounds are getting clinical trials.

• Synthesis of a new class of compounds—sulfonyl hydrazones—more effective in laboratory tests against staphylococcus and streptococcus bacteria than the sulfas, was disclosed by Benjamin Gross of Chattem Chemicals (Chattanooga, Tenn.). Their antibacterial action is different from that of the sulfas, suggesting that sulfa-resistant bacteria will succumb to the sulfonyl hydrazones. Clinical trials await toxicity tests.

• Lakeside Laboratories, Inc. (Milwaukee), is clinically evaluating 1-phenyl-2-propyl hydrazine for the treatment of the depressed state in human beings.

Among other noteworthy disclosures at the meeting:

• Freon-type gases dichlorodifluoromethane (Freon-12), dibromodifluoromethane, and monobromotrifluoromethane effectively lubricate nickel and cobalt alloys at temperatures to 1200 F. The studies, reported

by Donald Buckley, a lubrication research engineer of Lewis Flight Propulsion Laboratory (Cleveland, O.), could be important in aircraft and missile development.

• Mobay has turned up a mathematical method of planning properties of urethane foams while they are still in the liquid chemical stage. The system may take some of the guesswork out of foam formulation.

•

Isolation of the synthetic element, Californium (element 98), has been achieved at University of California radiation laboratory (Berkeley). The research was reported last week to the international atomic energy conference in Geneva (*see also p. 34*). Californium is the heaviest element ever concentrated in large enough quantity to be visible and weighable. Potentially, say UC researchers, it is the most useful element heavier than uranium with the exception of plutonium (element 94)—the atomic energy fuel. One isotope of Californium decays partly from spontaneous fission, making the element an excellent neutron source for research and industrial uses (e.g., logging oil wells—evaluating the various strata as they are reached by the drill). It may also help explain some mysteries of the fission mechanism.

•

General Electric has disclosed details of the plutonium fuel elements used in the new reactor at Arco, Ida. (*CW Technology Newsletter, Aug. 30*). At the Geneva Atoms-for-Peace congress, GE said that the Arco elements are thin strips of aluminum-jacketed plutonium-aluminum alloy brazed to the aluminum side wall to form a box with 18 tiers. Each lamination is only 0.060 in. thick. They are unlike the uranium fuel elements for AEC's Hanford plant, which are solid cylinders of uranium about 1 inch in diameter and 8 in. long.

•

Surgical mesh made of Phillips' Marlex high-density polyethylene has been used successfully in repairing tissue defects of the chest and abdominal wall. Dr. Francis Usher, associate professor of clinical surgery at Baylor University (Houston, Tex.), recently disclosed that the mesh he has been investigating (*CW, March 1, p. 26*) was used during the past year on 53 hernia patients in Houston hospitals and six other surgery cases. In no instance was it necessary to remove the mesh.

•

Allied Chemical discloses this week that it's supplying the elemental fluorine Bell Aircraft uses as an oxidizer for rocket fuels. Allied is also making several fluorine compounds for the same purpose. Although pure fluorine has the greater thrust, it has disadvantages that, some companies say, make it less useful than fluorine compounds. Pennsalt singles out perchloryl fluoride, Harshaw picks chlorine trifluoride, as being far less corrosive and packing much of the thrust of hard-to-handle fluorine.

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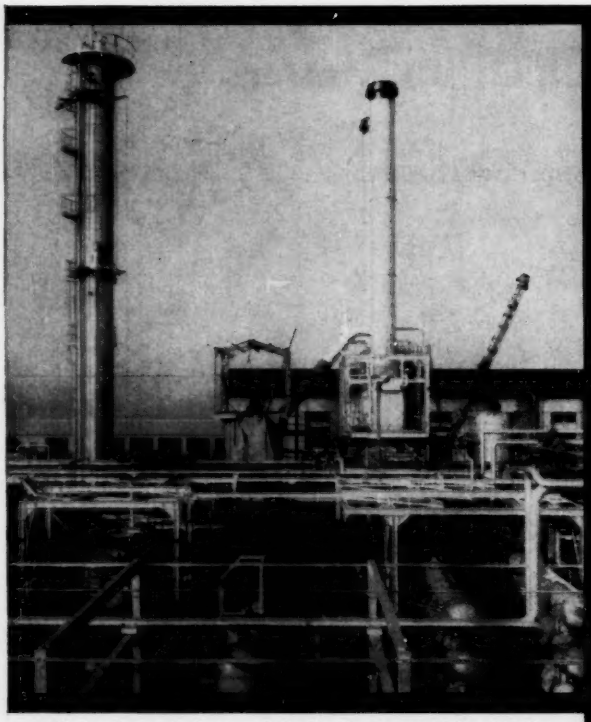
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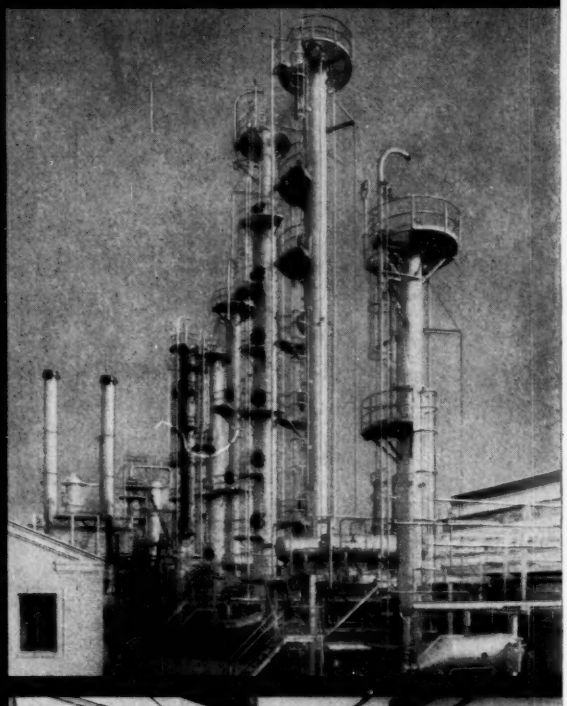
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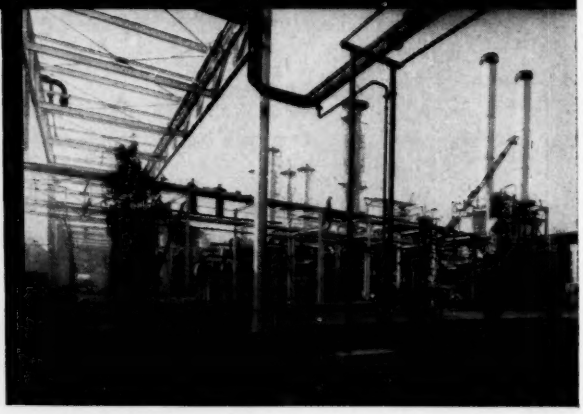
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Heat exchanger in foreground, fractionation tower at left and heater stacks on right during construction.





Top—Fractionation section of the finished Platforming and Unifining units.

Bottom—Nearing completion, heat exchangers, left, in series with the fractionation section and heaters on the right.

Procon construction helps rebuild Deutsche Erdöl A.G. refinery at Heide, Germany

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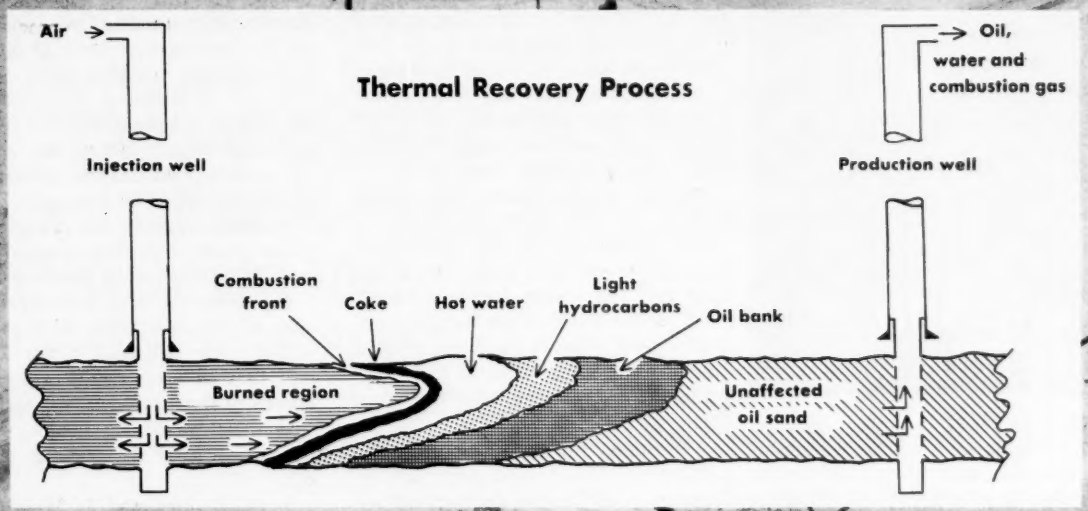
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Topside, GP's thermal recovery rig looks conventional, but underground it fans fires that are . . .

Boosting Recovery of Sand-Trapped Oil

Engineers at General Petroleum Corp. (Los Angeles) are this week analyzing data collected during a three-year, $1-million thermal recovery experiment at South Belridge, Calif. The tested technique may help producers wring more oil out of hard-to-tap reservoirs. But, although preliminary conclusions are that the plan works, it is admittedly costly (CW Technology Newsletter, Aug. 30.).

Despite what appear to be high production costs—largely attributable to the experimental nature of the project and some unusually severe operating conditions—GP is hopeful that the final analysis will disclose useful commercial applications. Socony Mobil Oil Co., several of whose affiliates have had a hand in the thermal process development, is a staunch booster of the new technique, feels it will eventually become a very important oil production tool in the U.S. and perhaps in foreign oil fields as well.

Technical Success: Goal of GP's underground combustion tests is to improve secondary recovery of oil from deposits that aren't well-suited to conventional water-flooding techniques. The South Belridge field in Kern County, Calif., was chosen for its similarity to many heavy-oil sands that yield low primary recovery, leave a large amount of oil in place.

By normal recovery methods, says

GP, it would take about 40-60 years to recover 10-15% of the oil in place. But by passing an underground combustion front through the oil zone, the experimenters boosted test-well production rates from 20 to 300 bbls./day—15 times their precombustion levels. Yield under thermal recovery: about 50% of the oil initially in place within 1½ years after ignition. Here's how the process works:

Heart of the combustion process is an injection well through which warm air, at about 100 F, is forced down into the oil sand. Heat generated by slow oxidation of the oil gradually raises the sand to a temperature that causes the oil to ignite.

As the burning region spreads outward from the injection well it pushes layers of coke, hot water, light hydrocarbons and an oil bank toward the producing wells *(see drawing, p. 79)*. When the front reaches the producing well, everything pops to the surface—oil, water and combustion gases.

GP says oil rates began to increase rapidly about two weeks after ignition. And from the recovery standpoint, only a small fraction of the otherwise unrecoverable crude is consumed as fuel in the process. The bulk of the fuel is coke and heavy residuum—the least valuable part of the oil. The lighter, usable fractions are pushed ahead of the burning front after their viscosity has been reduced by the combined effect of high temperature and the removal of the heavy ends.

Operating Snags: Along with the increased product yield, some serious operating difficulties also popped to the surface as the combustion zone reached the producing wells. High exhaust rates of burnt gases, corrosive conditions in the wells and high temperatures downhole made well maintenance difficult and costly, says GP, resulted in serious bottom-hole well failures. However, replacement wells equipped with stainless steel liners restored the maximum 300-bbls./day production rate for a short while, gave much better service than the original steel-lined wells. Water-oil emulsions also became a serious problem—even with stainless-lined wells—as the water cut increased with the approach of the combustion front.

Widespread Interest: Indicative of thermal recovery's potential commercial value is the large number of companies actively testing it. Magnolia Petroleum Co. pioneered the laboratory and field work on which GP's experiment was based; and 11 other oil producers* contributed to the three-year test project. Although none of these participants is known to have immediate plans for production installations, some other companies are weighing the commercial prospects of similar processes of their own.

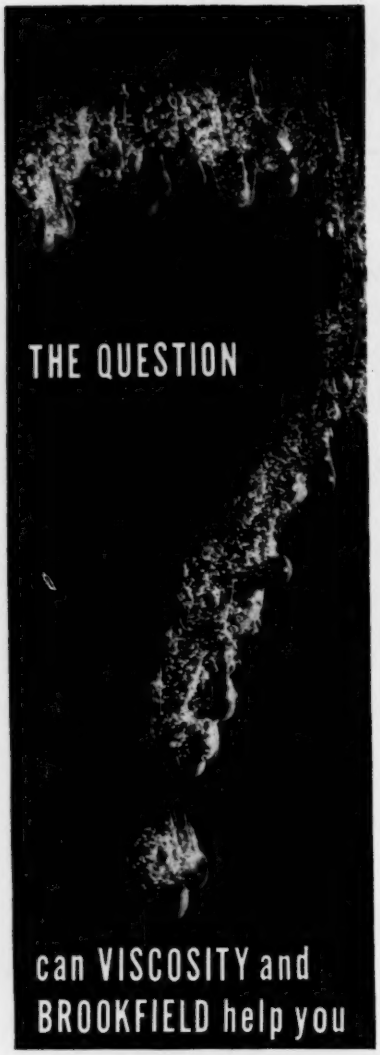
Sinclair Research Laboratories, Inc. (Tulsa, Okla.), for example, has been running semicommercial-scale tests of its underground heat-wave process for two years at a small, isolated field in southeast Kansas. It feels it's just about ready for full-scale commercial testing. Recovery by this technique is much higher than that produced by water-flooding, Sinclair reports. Test cores taken from the Kansas field indicated that all of the oil left by primary recovery methods was taken out by the heat-wave process. Sinclair is also currently working with Richfield Oil on potential application of the process to heavy California crudes. It had previously looked into a similar underground heating process for *in situ* extraction of shale oil.

Primary, Too: *In situ* combustion is also being evaluated as a primary recovery technique by Southworth & Wood (Houston, Tex.). Preliminary results of the company's pilot project at the Camp Hill field in east Texas indicate that a key factor in the economics of thermal recovery is the type of residual remaining (which would be burned) after the crude is driven out.

J. A. Perkins and J. W. Quinn, Houston petroleum engineering consultants on the S&W project, point out that "the process won't work on condensate because there would be no residual left to burn. And with too much residual left, you'd be burning up too much of the crude in place." S&W has been injecting air since April, doesn't expect optimum response for several months.

Shale Oil Innovation: An underground heating technique that utilizes electric resistance heaters, rather than direct combustion, is currently being developed in Sweden. The shale in-

*Firms cooperating with General Petroleum on the South Belridge tests include: Continental Oil Co., Chanslor-Western Oil and Development Co., Esso Research and Engineering Co., Gulf Oil Co., Honolulu Oil Corp., Ohio Oil Co., Shell Development Co., Sunray-Midcontinent Oil Co., Texas Co., Tidewater Oil Co., and Union Oil Co.



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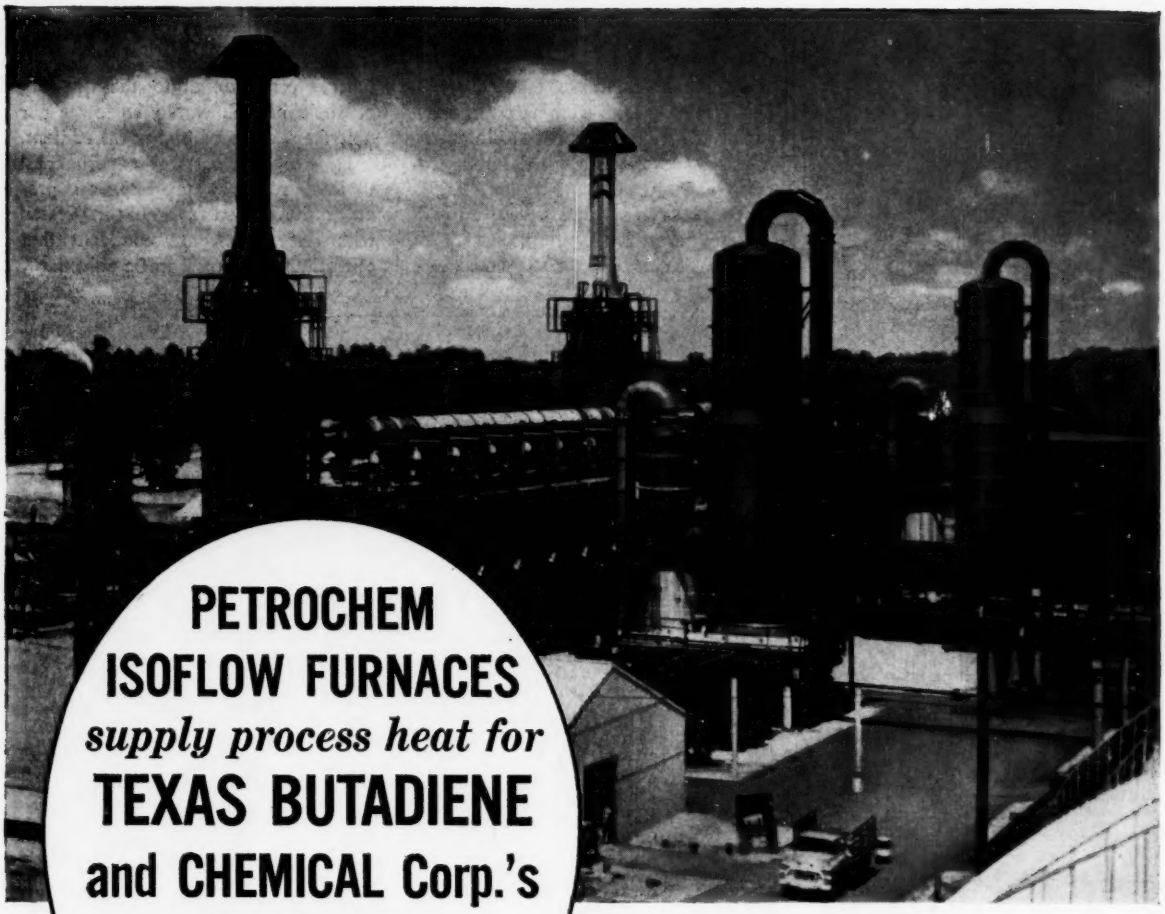


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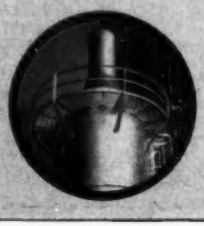
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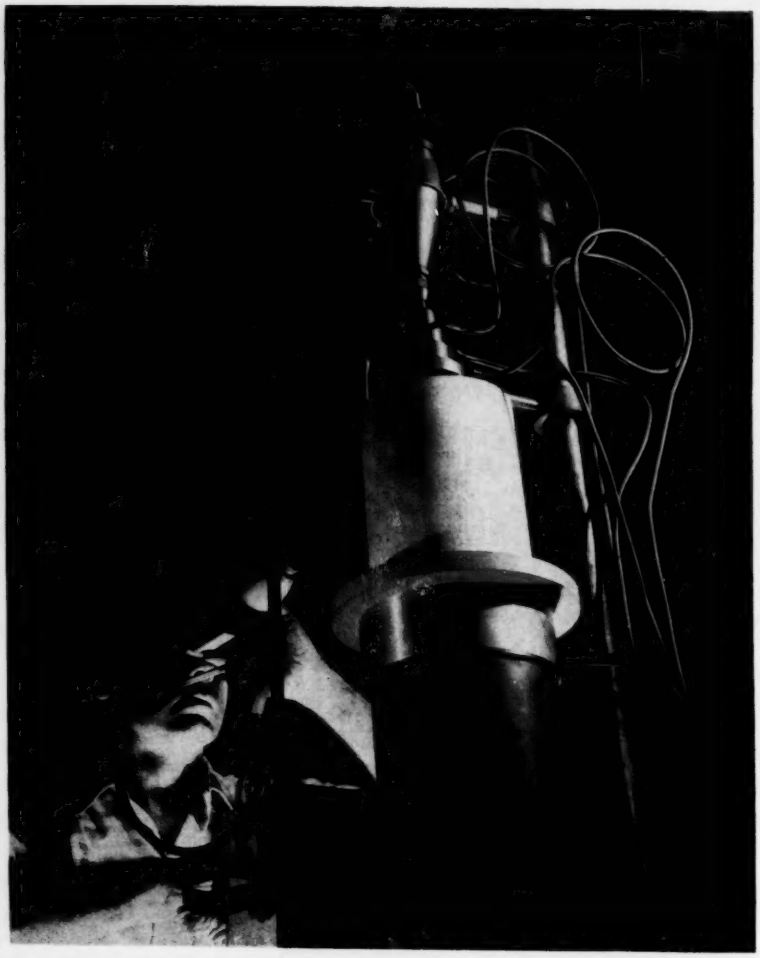
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dustry there hopes to eliminate the costly mining and grinding operations required for conventional shale-retorting processes. Test yields obtained from shale deposits averaging 5.6% oil content run about 1 gal. of oil and 120 cu.ft. of 1,000-Btu. gas per 25 kwh. of electricity. Power consumption is proportional to the quantity of shale heated, would be lower per unit from shale of higher oil content.

Despite high costs of experimental thermal recovery projects, oil producers have been favorably impressed with test results, are confident that operating problems can be solved.



Direct Route from Heat to Electricity

A new family of thermoelectric materials—substances that generate electric power directly from heat—was disclosed last week by Clarence Zener, director of Westinghouse Research Laboratories (Pittsburgh). Produced in a special laboratory furnace *(above)*, the novel ceramic-like materials are described as "mixed valence compounds of the transition metals." They are claimed to be inexpensive, readily available and simple to prepare. At 2000-3000 F temperatures, the new semiconductors reportedly are inherently resistant to heat, have thermoelectric efficiencies that could qualify them for power purposes.

Thermoelectric power won't replace large-scale generating methods, says Zener, but will likely find application where conventional methods are undesirable or impractical.

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ammonium fluoride

ammonium bifluoride

sodium fluoride

aluminum fluoride

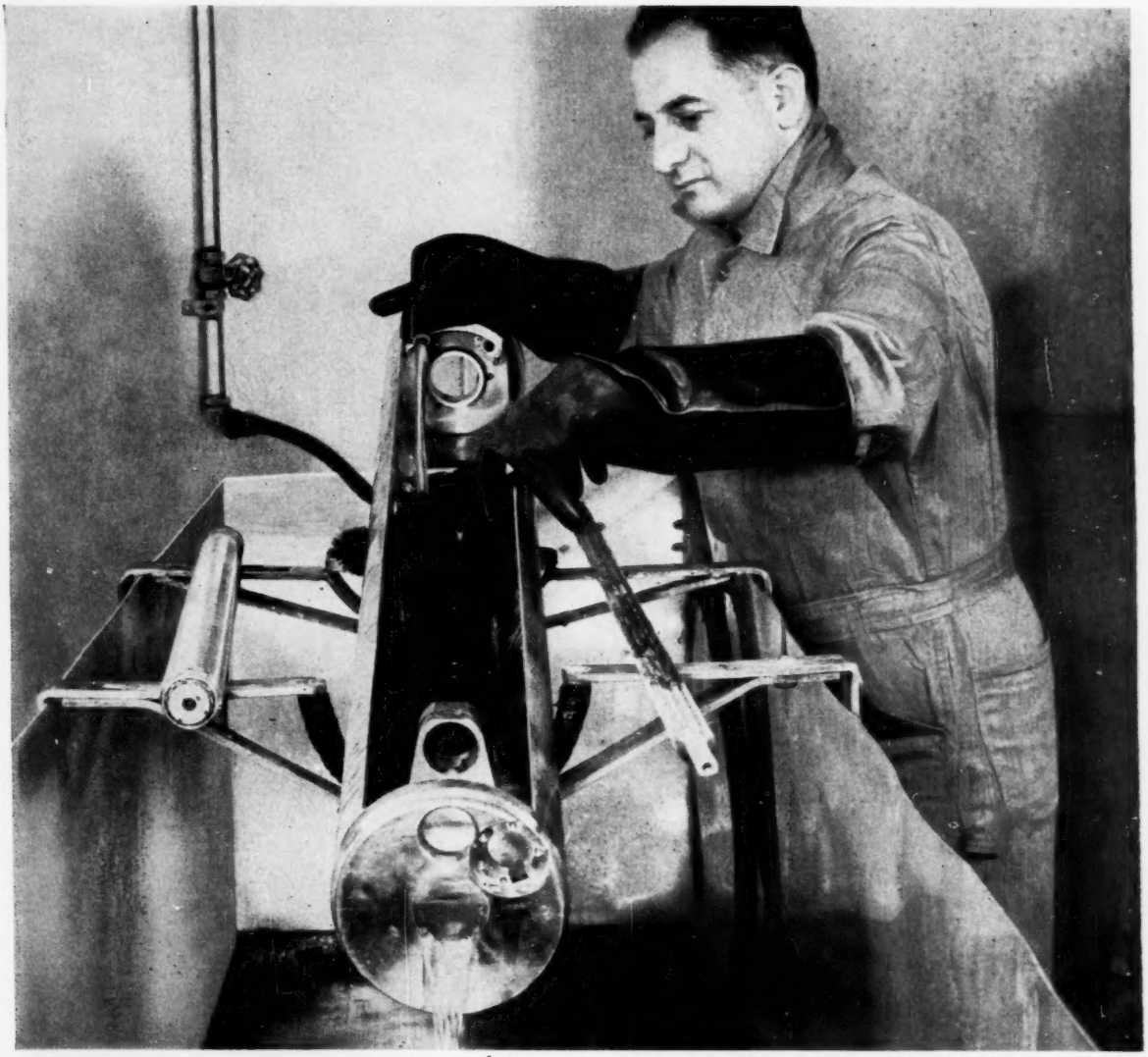
Other fluoride compounds on request

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A control rod drive housing being rinsed at Fairchild Camera and Instrument Corp. Radiological Decontamination Laboratory, Syosset, L. I., N. Y.

Ion exchange helps save "hot" reactor mechanisms from the nuclear cemetery

When valves, pumps, heat exchangers and other parts used in or with nuclear reactors became sluggish or clogged, they used to be taken out and buried in the ground because they were radioactive . . and replaced by new parts. This ran into money. A single control rod drive mechanism, for example, costs $30,000.

Now radioactive contamination is actually scrubbed off and rinsed away so that parts can be refurbished, reassembled and re-used . . at a fraction of their replacement cost.

Radioactive rags, brushes and cleaning fluids used for decontaminating are put in special containers and disposed of through licensed agencies.

But the problem of what to do with the contaminated rinse water is easily solved at Fairchild by their Permutit Nuclear Purifier. Each refill of 3 cubic feet of Permutit ion exchanger resin in this unit safely decontaminates thousands of gallons of rinse water!

Other nuclear applications where Permutit ion exchange is employed: concentration of uranium from ore, demineralizing reactor coolant water, treatment of radioactive wastes and purification of heavy water.

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Market Newsletter

CHEMICAL WEEK
September 13, 1958

A raft of plant expansions and price cuts marks the chemical industry's swing into fall activity. Among the changes in price tags:

Polypropylene prices knocked down by 7¢/lb. by Chemore, Montecatini's U.S. representative. The move follows similar reductions posted recently by Hercules Powder (*CW Market Newsletter, Aug. 30*). Effective Sept. 2, the firm's Moplen polypropylene (natural resin) will sell for 49¢/lb. in truckloads; standard colors will cost 58¢/lb. Smaller quantities are reduced 7¢/lb. down the line.

Glycidyl methacrylate tabs sliced in half by Du Pont. The original development price of $5/lb. is now cut to $2.50/lb. in 55-gal. drums, $3/lb. in 1- or 5-gal. cans. The reductions, effective Sept. 1, are made possible by scaled-up production. Further price cuts for the chemical, it's hinted, may be in the offing.

Mono- and dimethylamine prices shaved 3¢/lb. by Rohm & Haas. New listings for monomethylamine range from 26¢/lb., in tank cars, to 40½¢/lb. in 25- and 50-lb. cylinders. Prices of 40% monomethylamine solutions range from 26¢/lb. in tank cars, to 43½¢/lb. in less-than-drum quantities. Reduced tabs on the dimethylamine are 2¢/lb. higher, down the line, than mono.

There's one increase: ethanol and isopropyl alcohol tabs upped by more than 10% by Enjay. It's the first boost on these materials since '56 and is caused, says Enjay, by freight costs going up 30-40%, wages rising 13%, raw material climbing 12%.

Effective Oct. 1, all ethanol tabs will be increased 5¢/gal. (except for proprietary solvent, up 6¢/gal. and special denatured alcohol, up 8¢/gal.). New quotes: 190-proof ethanol will be 52¢/gal., delivered in tank cars. Proprietary solvent will be 56¢/gal.

At the same time, all grades of isopropyl alcohol will be priced 5¢/gal. higher. Anhydrous (99%) material will be 46¢/gal., delivered in tank cars.

•

A 250% boost of oxygen capacity at Air Reduction's Lorain, O., plant pushes potential daily output from 40 tons to 100 tons/day. The just-completed expansion was spurred by large increases in consumption by local steelmakers. Chemical and missile needs also helped hike demand.

The expansion—the third in as many weeks—was preceded by completion of oxygen facilities for U.S. Steel's Gary Works, and Granite City Steel's plant (*CW Market Newsletters, Aug. 23 and Sept. 6*).

•

Other expansion and new products this week:

• Nickel catalyst and plating salt production facilities have

been expanded by Nuodex Products (division of Heyden Newport) at Elizabeth, N.J.

• Full production has been resumed at Pittsburgh Coke & Chemical's No. 2 battery of 35 coke ovens at the firm's Neville Island plant. Battery No. 2—one of four owned by the firm—has a coal carbonizing capacity of 355,000 tons/year yielding about 255,000 tons of coke.

• Hot-pressed and machined beryllium oxide shapes are available from The Beryllium Corp. (Reading, Pa.) for use by nuclear, aircraft, missile and electronics industries.

•

Building of American Potash & Chemical's sodium chlorate plant at Aberdeen, Miss., is right on schedule; it will likely go onstream in late '58. Initial production capacity is rated at 15,000 tons/year, but extensive and rapid expansions in the future are possible. Conventional manufacturing methods will be used, namely, electrolysis of brine solution followed by crystallization and drying.

•

First industrial consumer of St. Lawrence electric power is Aluminum Co. of America (Massena, N.Y.), which last week put into operation two potlines, with a capacity of 54,000 tons/year. A second line is scheduled to start up Oct. 15. These startups complete the first phase of the firm's $25-million modernization and expansion program that's keyed to the St. Lawrence seaway and power project.

•

One target, one prediction:

• Projected five-year goal of Vat Dye Institute is expansion of vat textile dyestuff sales to 50 million lbs./year by '63. Methods suggested: upgrading color quality, development of wash-and-wear markets.

• Some 45 million lbs. of urethane foams will be sold this year and a 100-million-lbs./year market is only two years off, according to a forecast this week by Mobay's marketing director, James D. Mahoney, at American Chemical Society's meeting in Chicago.

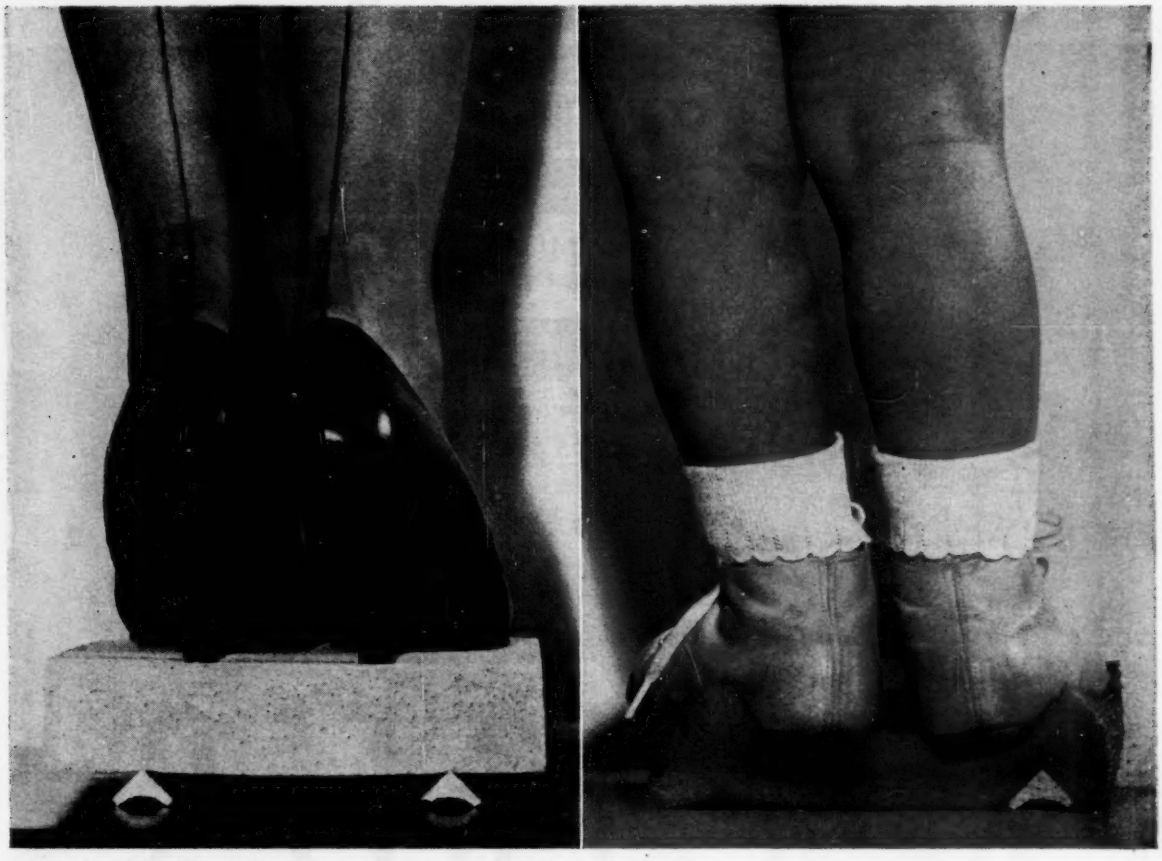
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First ocean-tanker bulk shipment of U.S.-made acrylonitrile—1,000 metric tons—reached Coleraine, Ireland, last fortnight. Monsanto—the shipper—will continue to send the chemical to Ireland via Rotterdam, where it's transferred to smaller vessels. Bulk shipments will also be made from Rotterdam to customers in Great Britain and Europe.

SELECTED PRICE CHANGES—WEEK ENDING SEPTEMBER 8, 1958

DOWN	Change	New Price
Dimethylamine, 40% soln., dms., c.l., frt. equald., 100% basis	$0.03	$0.35
Monomethylamine, anhyd., cyclo., l.c.l., frt. equald., 100% basis	0.03	0.30
Platinum metal, works, oz.	1.00	56.00
Tin metal (Straits)	0.00125	0.9475

All prices per pound unless quantity stated.



RIGID OR RESILIENT—With slight changes in formulations, vinyl foam in a wide range of hardness is possible with Du Pont BL-353 Blowing Agent.

Make VINYL FOAM in a wide range of properties with Du Pont BL-353 Blowing Agent

Multiple Uses • Du Pont's general-purpose chemical blowing agent BL-353 releases nitrogen at a uniform rate when heated to form either vinyl foam or cellular vinyl. There is no end to what you can do with it.



BL-353 for instance, makes foam for cushions, fish net floats, sheet material, semi-rigid foam shoe soles, boat fenders or children's toys, to name the uses shown above.

Variable Hardness and Density • With only slight variations in the formulations and processing conditions expanded vinyl can be obtained in a wide range of physical properties—from rigid to soft and resilient and in densities from 2.5 to 35 lbs./cu. ft.

Make It Thick or Thin • You can easily get thick or thin slabs of vinyl foam by fusing and curing with dielectric heat. Make it in thin sheets or in slabs up to 6″ thick.

Variety of Colors Possible • You can make your foam in any color you want including snowy white because Du Pont BL-353 imparts no color to the resin. It won't affect odor either.

Make Both Vinyl Foam and Cellular Vinyl • With Du Pont BL-353 you can make either vinyl foam (with interconnected cells) or cellular vinyl (non-interconnected cells). Either way you get fine, uniform, cell structure throughout the sponge.

Available in Commercial Quantities • Write for more information and ask for a sample of Du Pont BL-353 for your own product testing. You can get it in commercial quantities when you need it. Write to E. I. du Pont de Nemours & Co. (Inc.), Chemical Sales, Explosives Dept. CW9, 2543-Nemours Building, Wilmington 98, Delaware.

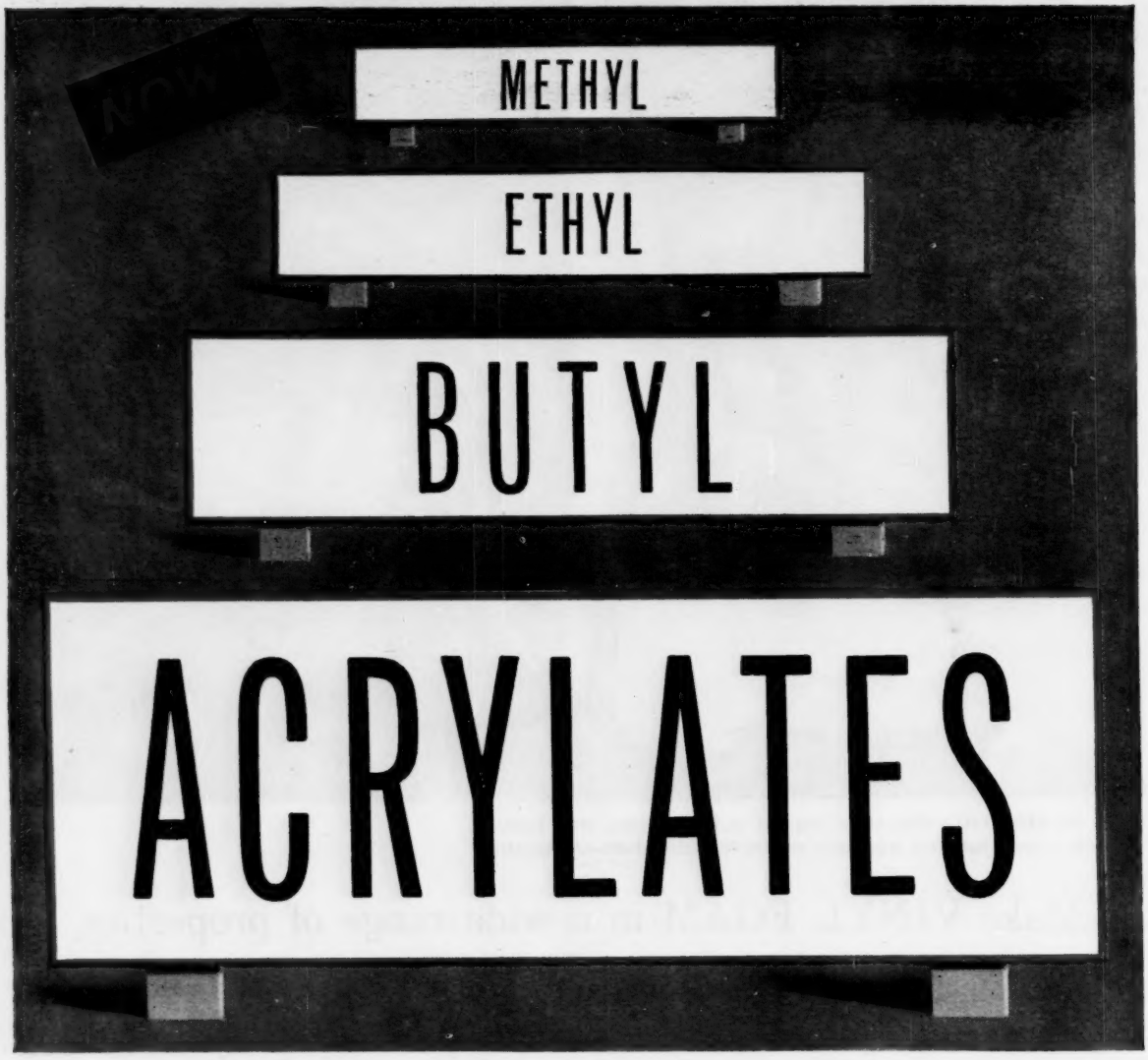
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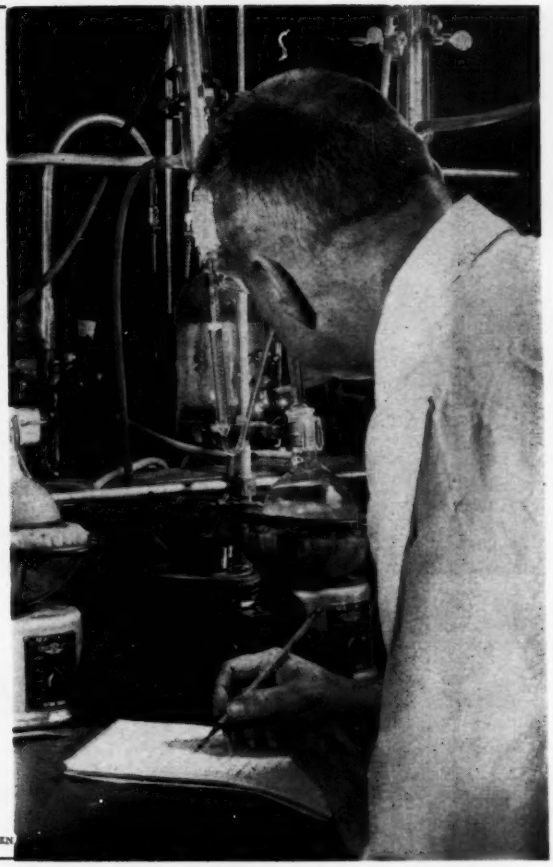
In Canada: Canadian Chemical Co., Limited, 2035 Guy Street, Montreal, P. Q. • Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16.

Retiring Your Researchers — Three Main Approaches:

1 **"We retire a researcher at 65, just like any other employee"**

2 **"We keep researchers on after 65, contingent upon their health"**

3 **"If a researcher is useful after 65, we rehire him as a consultant"**



CW PHOTO—SYD KARSEN

CPI's New Attitudes Toward Retirement

How do you handle the growing problem of managing the retirement of researchers in the over-60 bracket? Aside from the rigid "retire them at 65" plan, two other policies recently have been gaining favor in the CPI, CW's nationwide survey shows this week.

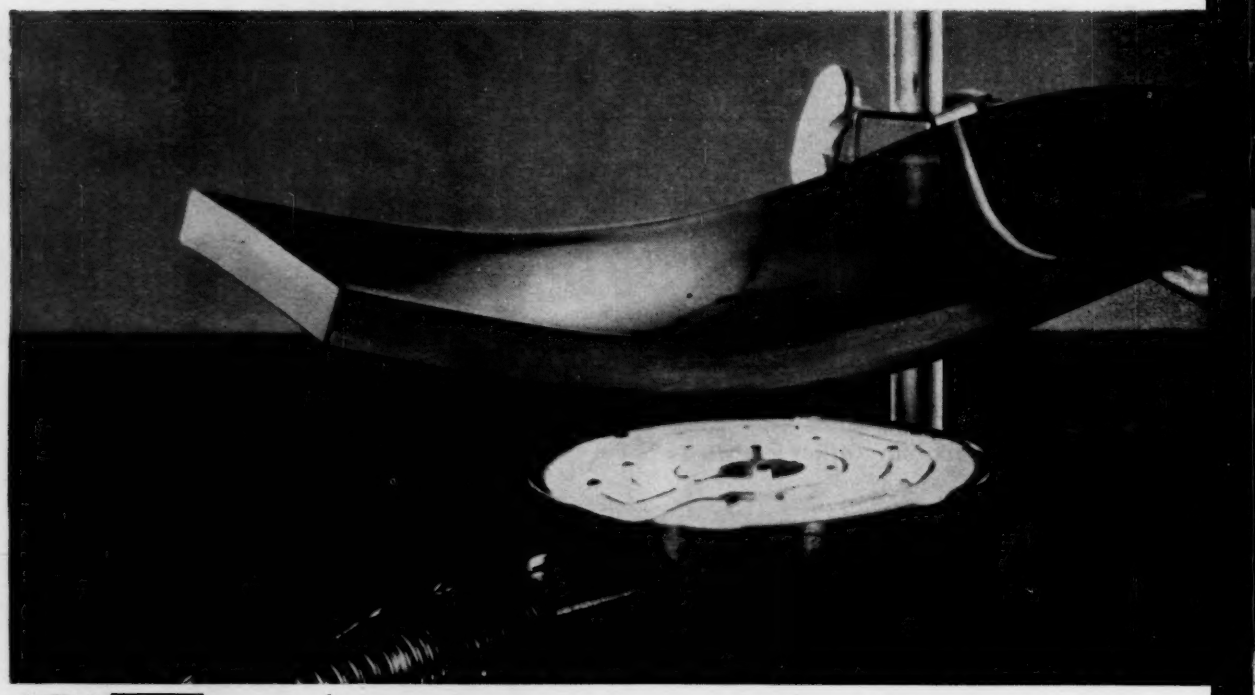
Basically, those firms that have flexible plans follow two main courses—they may keep their researchers on after 65, if they are still creative and their health permits; or they may retire them, and rehire them as consultants.

A Few Extra Years: Those firms that keep research workers past the "standard" retirement age only do so within limitations—few keep them beyond the age of 70, and they do so then only after considering all aspects of the situation.

As an Eastman Kodak spokesman put it, "We have a flexible retirement policy, and consider each case individually. Whether an employee at retirement age is kept on is determined by his physical and mental well-being, his knowledge and ability, the effect his staying will have on the promotional opportunities in his area of work, and the general effect on the morale and efficiency of the organization."

Interchemical Corp. (New York) is another proponent of taking a careful look at a researcher to see if it is worthwhile to retain him. If it is, the man is kept on but the firm each year reduces his work schedule, and his pay (although not as fast as the work reduction), until he's putting in half-time at about age 70, when he usually asks to retire. Among others echoing the Eastman and Interchemical policies are Victor Chemical, Pfizer, Armour Research Foundation and B. F. Goodrich.

Retire—Rehire: Another plan chosen by several companies is a sort of compromise between mandatory retirement and permitting researchers to continue on the job. This is to retire researchers, then use their services on a consulting basis. Some firms go beyond this, seeking out researchers who have been retired by other companies. One proponent is the Armour Research



3M Chemicals opening new worlds of use for epoxies, elastomers, paints, sealants

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Now, with **CARDOLITE® NC-513**, flexibility in epoxy resin systems can be maintained permanently . . . even at temperatures that range from a biting-cold **−65° F.** to a blistering-hot **+400° F!**

This low-viscosity flexibilizer—from **3M's IRVINGTON CHEMICAL DIVISION**—is one of many examples of 3M chemistry hard at work creating countless new applications for industry's products.

Because of **CARDOLITE NC-513**, resin systems can be formulated with any degree of flexibility desired. The resin can be flowed around even the most complex electrical parts. And risk of trapping air bubbles is cut to a minimum.

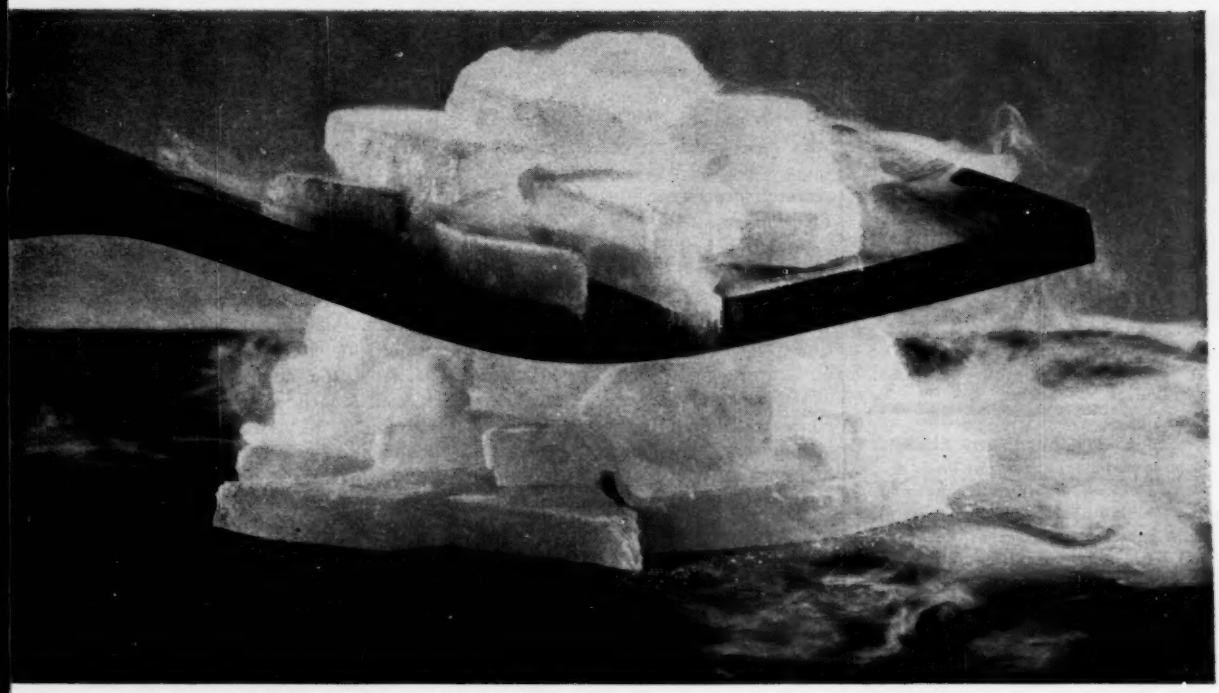
NC-513 systems have excellent electrical properties, chemical stability and age-resistance. What's more, **NC-513** reacts with the same curing agent as the epoxy, so that the cured resin is not weakened as it is when thinned with solvent. And, with **NC-513**, manufacturers are cutting costs by adding more filler to their resin systems.

Through economy and performance, **CARDOLITE NC-513** is uncovering a host of new applications for epoxies. Look to the other products on these pages, too, for new performance that might profit you in your industry. For free literature on any or all of them, write: *3M, Dept. WE58, St. Paul 6, Minnesota.*





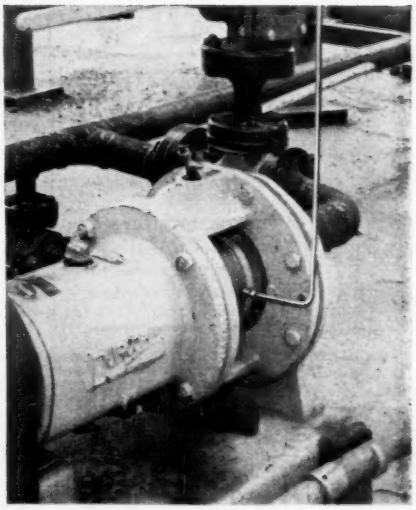
Hand-in-glove. KEL-F® Elastomer and top performance under high temperature and corrosive conditions go together! Nitric acid poured onto this KEL-F glove shows the extreme chemical resistance of this remarkable halofluorocarbon rubber. High-temperature performance? KEL-F Elastomer offers thermal stability to +400°F. JERSEY CITY CHEMICAL DIVISION.



TEMPERATURES THAT BITE OR BLISTER!



High-performance primer base. A test strip of 3M Brand Primer Concentrate 911 used as a primer base was sprayed on this Northwest Airlines DC6B in addition to the top coat. Then the plane logged 2,100 air hours at speeds averaging 300 m.p.h. or approximately 63,000 miles. Because of the resiliency of Primer Concentrate 911, the test strip showed no signs of blistering or flaking . . . and sharply reduced wind erosion effects. HASTINGS CHEMICAL DIVISION.



"Do-nothing" chemical. The conventional sealant in this HF processing pump was replaced by a 3M fluorochemical inert fluid. Because this "do-nothing" chemical normally won't react with, mix with, dissolve in anything, it resists the acid's attack. Result: greatly increased efficiency; no more HF fumes. FLUOROCHEMICALS DIVISION.

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North Walnut St., Madison, Wis.

RESEARCH

Foundation which says, "We have found it profitable to hire researchers who have retired from other firms." Gain: the benefit of decades of research experience plus a new slant on problems.

Abbott Labs is among others thinking of trying this retire-rehire plan, but it "has not faced this problem yet." This comment was made several times to *CW*'s reporters—since many CPI firms are "young" themselves.

Many of the newer firms have concentrated on hiring young men, and all but very few of their top research management men are far from retirement age. One West Coast vice-president of research and development said, "It appears that some technical men at 65 no longer are very useful. Things advance so fast that if the men don't grow with the times, they handicap the thinking of the younger men. My feeling is that if a company has a retirement program, it shouldn't make special exceptions."

End-of-the-Line: But this is just one of many reasons why many large CPI companies — and this includes such firms as Morton Chemical, American Potash, Union Oil, Harshaw, and Goodyear — have policies to retire all employees at 65. Often it is the result of union pressure. But the most-used reason for strictly maintaining compulsory retirement revolves around concern for the morale of the younger men.

Donald Taylor, head of U.S. Borax research, explains it this way: "The compulsory retirement program helps sustain the incentive of its younger men. Without such a program, prospects for advancement would depend upon death or voluntary retirement of older men, a rather discouraging situation. It's true that by this policy you occasionally lose the services of a researcher who is capable of real creative effort, but what is the alternative?"

Early Retirement: It should be pointed out that many researchers are eager to retire. National Carbon Co.'s (a division of Union Carbide) management says, "We have quite a few workers we'd like to have stay. But they feel that once they reach 65, they have a right to retire."

Several firms have even made it possible for employees to retire before the nationally accepted "normal retirement" age of 65. This alternative is usually found in companies where various pension and annuity plans provide for "early" retirement, based on a set number of years' service to the firm. Union Carbide has such a policy, adds, "It isn't used too often."

Shell Development Co., research arm of the Shell Oil Co., provides for "normal" age-60 retirement for men, 55 for women; workers have an option to work an additional five years, if the company needs them.

Shell is inclined to encourage early retirement, or at least allow employees to retire as early as they want to. It recently had a vice-president retire in his mid-50's — he'd been in the business 30 years. Others that permit early retirement say the plan isn't often taken advantage of, because of the lapse of time between retirement and the time that government social security benefits become available.

CW's survey makes it evident that solutions to the retirement problem must be varied to meet specific work, personnel, and morale situations. As long as researchers retain their individuality, dealing with them will be anything but a standard procedure.

EXPANSION

• A U.S. Army Radiation Center is to be built at Sharpe General Depot in Lathrop, Calif. The center, to include plant and laboratory, will be operated by Curtiss-Wright Corp. When completed in mid-1960, it will employ a high intensity cobalt-60 source and a 24 mev linear accelerator.

• Nordson Pharmaceutical Laboratories Inc. (Irvington, N.J.) is new name of the old Nordmark Pharmaceutical Laboratories Inc. The change was made necessary by trademark registration problems here and abroad, will not affect the firm's operations.

APPARATUS

Microtubing: Quartz tubing .003" diameter, close to the diameter of human hair, is available from Monsanto Chemical Co. (St. Louis). Developed for the AEC, it has a greater tensile strength than steel, can be tied in knots, has high-temperature resistance, is nonconductive.

•

Carbon Analyzer: Fisher Scientific Co. (Pittsburgh) is out with the

Using Salt Efficiently

by INTERNATIONAL SALT COMPANY, INC.



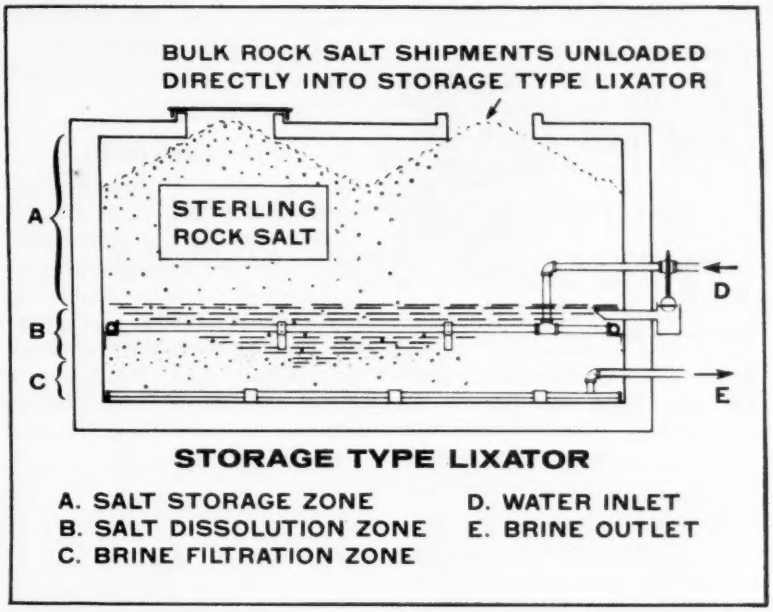
Producing Crystal-Clear Brine at Lowest Cost—by Self-Filtration

Today, more and more companies are using a foolproof brine-making process that produces crystal-clear brine from rock salt, *without using supplemental filter beds or other filtering devices.* This process takes place in the "Sterling Lixator," a rock-salt dissolver developed exclusively by International Salt Company. Operating on International's principle of self-filtration, the Lixator produces a rock-salt brine so high in purity and so brilliantly clean and clear that it can be used in many operations formerly thought to require highly refined evaporated salt.

Here, briefly, is how self-filtration works in the Sterling Lixator: A Lixator is filled with Sterling Rock Salt. Water, admitted near the top, dissolves salt as it flows downward. While flowing down, the brine made in this way becomes fully saturated, and can dissolve no more salt. Still flowing down, this brine is *completely filtered* by the salt-crystal bed in the bottom portion of the Lixator. Thus, the Lixate Brine drawn off through a discharge pipe at the bottom of the Lixator is clean, pure, crystal-clear—and the only source of power used is gravity, which costs nothing!

Other Lixator advantages. In addition to this superbly clean, fully saturated Lixate Brine, a number of other advantages are yours, when you use a Lixator:

- The Lixator permits salt storage and brine making at one location most convenient to the point of salt entry. *Pipes* deliver brine to points of use.
- Because Lixate Brine is piped to points of use, the work of moving dry salt from storage piles to other plant locations is eliminated. This can produce substantial savings in labor.
- The Lixator *automatically* controls salt feed, water feed, and brine discharge. Rapid, uniform brine production is maintained constantly, because in the Lixator there is no bridging, caking, or channeling.



The Storage Lixator — designed for larger operations. This is a combination salt storage tank and dissolving tank. On delivery, rock salt is unloaded directly into the Storage Lixator. The rest is automatic.

Many types of Lixators are available from International Salt Company. In addition to Storage Lixators, there are Silo Lixators and Sterling Model Lixators—in numerous designs to suit any plant layout. And every Lixator operates on the economical self-filtration principle.

For expert advice on the particular Lixator type that will do the best job for you, phone or write the nearest district sales office, or write to us direct. One of our sales engineers will gladly show you how this remarkable brine-making equipment can help you use salt most efficiently and economically.

Using salt efficiently in its many industrial applications calls for technical knowledge and experience. International Salt Company has both. Plus a continuing program of research and development in salt. These things can be put to work for you, in your plant, to help you get the most out of the salt or brine you use.

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RARE EARTHS SERVE YOU EVERY DAY

A variety of common uses of these unique materials

a report by LINDSAY

We've often suggested on this page that you might find interesting and profitable uses for the rare earths in your manufacturing processes. Here are some of the common but none-the-less exciting applications of rare earths.

Sharp News FROM **Kodak**



If you are a camera fan, you've probably heard about rare element glass developed by Eastman Kodak. It is called "rare" because it contains, among other things, lanthanum which is one of the rare earths.

Kodak utilized the principle that rare earth glass has a very high refractive index in relation to its dispersion. It, therefore, bends light more and spreads colors less. This permits production of lenses with shallower curves and, consequently, less inherent aberration. The result: higher quality lenses with fewer glass parts.

Rare element glass was perfected by Kodak for high precision military needs during World War II. The exciting part of the story is that Kodak's optical engineers have now found a way to produce rare earth element glass lenses in quantity at greatly reduced costs. That's why today you can get so fine a precision Kodak lens so economically.

Next time you get color slides with beautiful, needle-sharp images, shot with your favorite camera (Kodak, of course), you can thank the imaginative engineering of the people at Kodak . . . and think, too, of the amazing versatility of the rare earths.

IF YOU WEAR GLASSES

Chances are that your glasses were polished with ceria, a rare earth oxide preferred by many of the better optical firms. Cerium oxide is also widely used to polish high precision optical instruments, mirrors and other glass specialties. Speaking of versatility, certain of the rare earths are used to decolorize glass; others add the lovely, delicate colors so many people like in fine glassware.

HAVE A LIGHT

Top quality lighter flints are made of misch metal (an alloy of mixed rare earths). Rare earth metals are also used to create better alloy steels and magnesium alloys for high temperature service.

OUT OF THIS WORLD



Thorium, intimately associated with the rare earths, is literally out of this world – in the outer atmosphere! For thorium is an essential metal in the production of the alloy skin of the third stage of a rocket. Thorium has unique qualities which make it possible to produce a thorium-magnesium alloy which does not burn up at the fantastic speed of the rocket—up to 18,000 miles per hour.

AND A FEW MORE

More perhaps than you have suspected, *you* enjoy *every day* the benefit of the truly remarkable qualities of rare earths. They are used in the production of such widely diversified daily essentials (to name only a few) as movie projectors, textiles, ceramics, paint, TV picture tubes, petroleum, chrome plating, electrical resistance alloys, pharmaceuticals, ink, X-ray machines. Does all this give you an idea you can explore in your business?

THIS IS THE "COMMERCIAL"

As the TV announcer says, we pause for a brief announcement. If you are thinking about the possibility of using rare earths, even in the high purities, don't worry about availabilities. Most of them are available for prompt shipment in quantities of an ounce to a carload. How much do you need? Even more important, prices have been sharply reduced during recent years. You'll find the rare earths economically practical . . . and wonderfully useful.

So here's ample evidence that rare earths touch you in some way virtually every day. Certainly they are worth your own critical investigation. What helpful information would you like from us – today?

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RESEARCH

Fisher Induction Carbon Apparatus, developed to make carbon determinations in organic, ferrous and nonferrous samples. It reportedly can make an analysis in 2½ minutes. Price: $975.

•

Dehydrator: Economically obtainable dew points as low as —150 F is the featuré of Dehydrators Inc.'s (Tulsa, Okla.) new unit. It will reportedly remove one pound of water for as little as 7¢, compared to previous costs of $2.50 or better. It may be used with gases and liquids.

•

Detector: BJ Electronics, affiliate of Borg-Warner Corp. (Santa Ana, Calif.), offers a new gamma-beta radiation monitor for "hot" labs. It's portable, costs $238.00 complete.

REPORTS

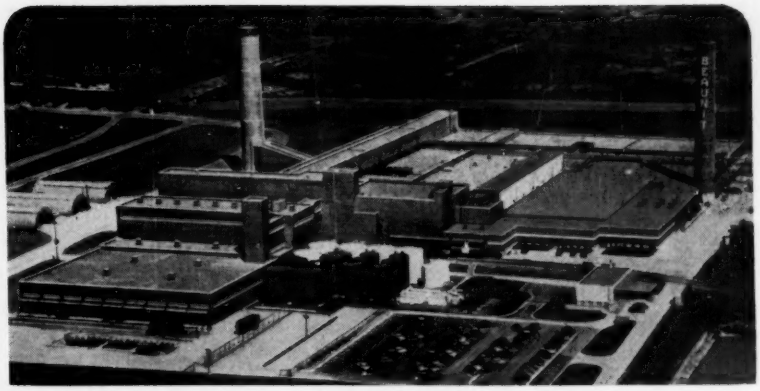
These reports are available from the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.:

• Five catalogs of technical reports listing all research reports available from the OTS collection in the following fields: Molded Plastics (CTR-347, 10¢); Polystyrene (CTR-346, 10¢); Zirconium (CTR-344, 10¢); Greases and Lubricants (CTR-345, 10¢); Anodic Coatings (CTR-348, 10¢).

• The "Report of the United Nations Scientific Committee on the Effects of Atomic Radiation" presents results of a U. N. survey. It may be obtained from the International Documents Service, Columbia University Press, 2960 Broadway, New York, 27, N. Y. Price: $2.50.

• An "International Standard for the Determination of Hardness of Vulcanized and Synthetic Rubber," approved by 26 nations including the United States, is available from the American Standards Assn. 70 East 45th Street, New York, for 80¢. This recommended method has been incorporated by the ASTM in its standard D 1415-56 T.

• Two new quarterly reviews published by the Atomic Energy Commission are: "Reactor Fuel Processing" and "Reactor Core Materials." They are available on $2/year subscriptions, or as single copies (at 55¢ each) from the Supt. of Documents, U.S. Government Printing Office, Washington 25, D.C.



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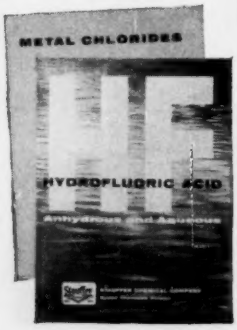
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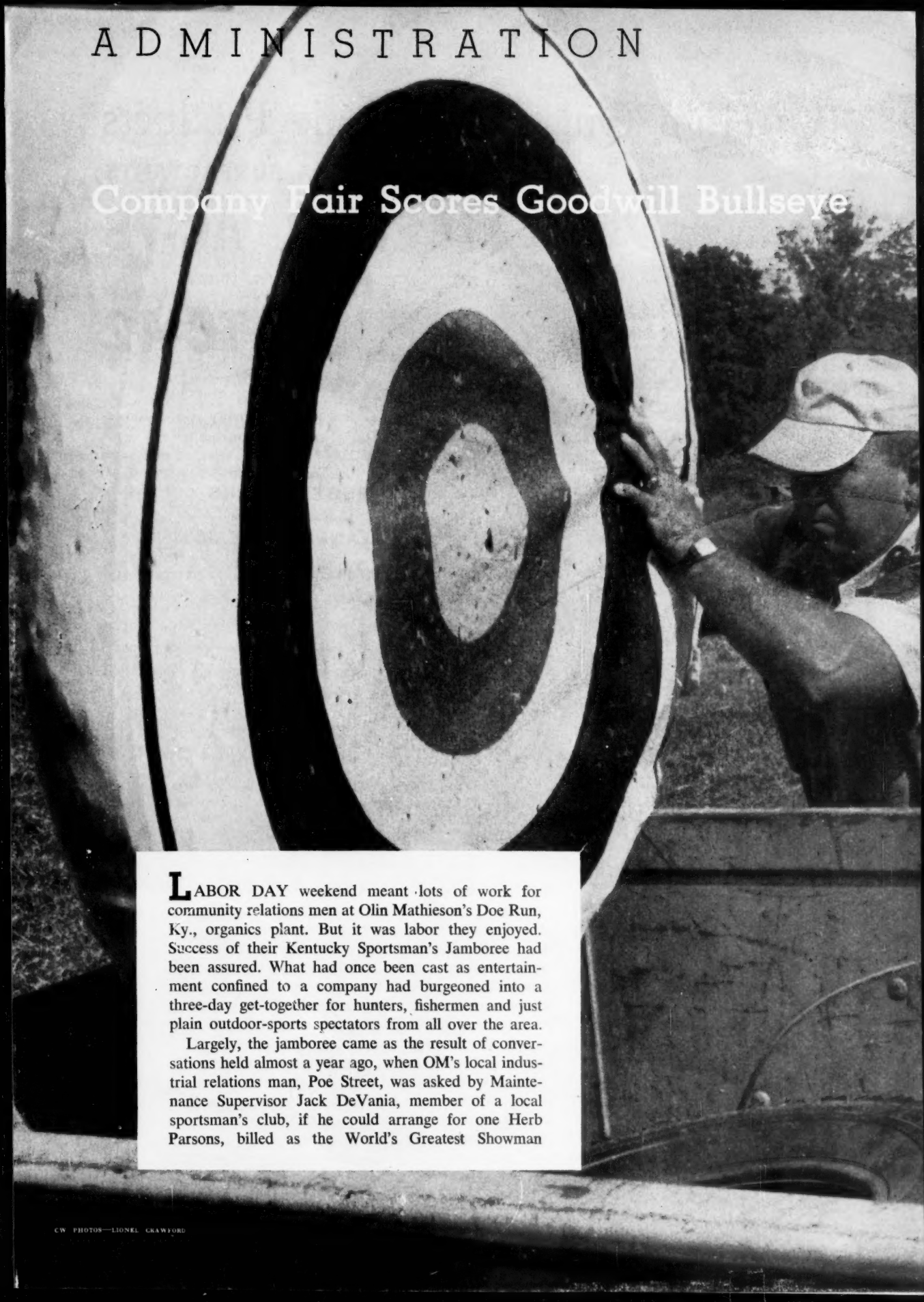
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LABOR DAY weekend meant lots of work for community relations men at Olin Mathieson's Doe Run, Ky., organics plant. But it was labor they enjoyed. Success of their Kentucky Sportsman's Jamboree had been assured. What had once been cast as entertainment confined to a company had burgeoned into a three-day get-together for hunters, fishermen and just plain outdoor-sports spectators from all over the area.

Largely, the jamboree came as the result of conversations held almost a year ago, when OM's local industrial relations man, Poe Street, was asked by Maintenance Supervisor Jack DeVania, member of a local sportsman's club, if he could arrange for one Herb Parsons, billed as the World's Greatest Showman

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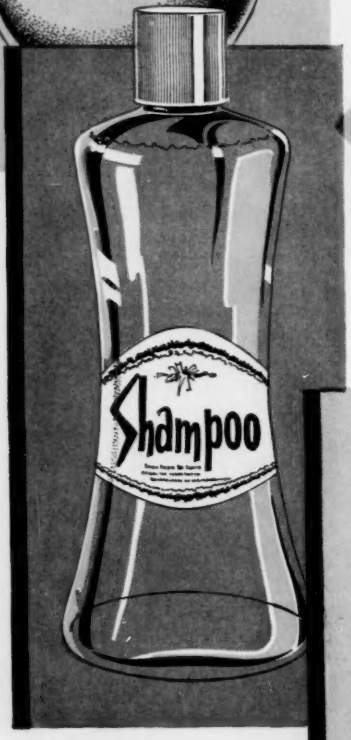
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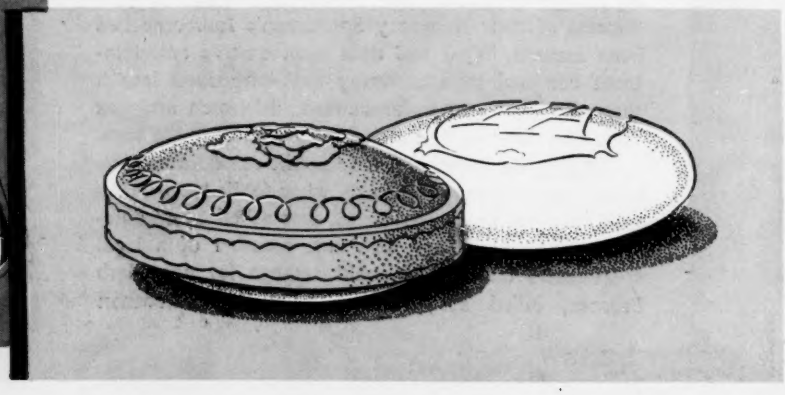
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OM Efforts Score Goodwill Bullseye

(continued)



Region's archers test their skills against world champion Smathers.

OM accountant Bonnette's daughter, Suzanne, prepares for trap shoot.



Shooter, to appear before the club.

Street agreed to contact Parsons (who works full-time as a promotion stuntman for OM's Winchester-Western Division) after he found out that the clubmen believed they could get upwards of 2,000 spectators to attend. It was at this point that Street recognized an opportunity for OM to foster its community relations program. He and his assistant, Robert Jackson, decided that they would unobtrusively give as much time and cooperation to the project as they could.

During the year before the big event, three more sportsman's groups in Kentucky joined to sponsor the program. The state wildlife and conservation commission added its interest, and OM plant manager Jack Thomas told Street and Jackson to go ahead with their plans.

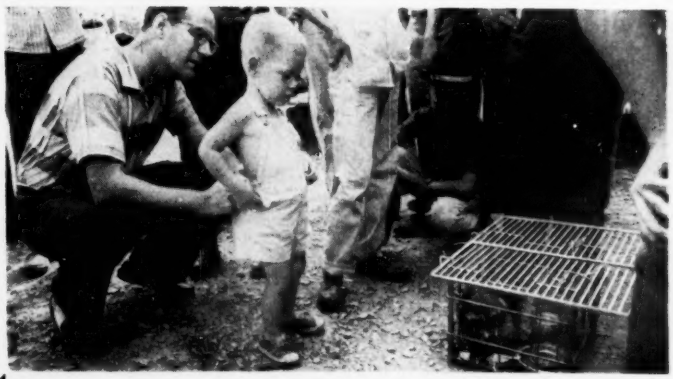
The Program: Bit by bit, they added special events to the already ambitious program. The first day, Saturday, featured a plug-casting contest in the morning followed in the afternoon by an archery exhibition by O. K. Smathers, the world champion amateur, who works for OM at its Pisgah Forest paper mill as an electrician.

Sunday there were pistol matches (using Winchester-Western ammunition donated by a local retailer), a 50-bird trap race, and Parson's shooting exhibition. Lauren Booker—Kentucky District sales manager for Winchester-Western, and no mean shooter himself—assisted Parsons.

Monday featured rifle matches, a firearms auction and lively bartering at the trading post.

'Coon drag' gives local hunters chance to test dogs in competition.





State conservation officer lends helping hand to young casting enthusiast.



Open trap shoot proves jamboree highlight for shooters and enthusiast crowd of 5000.

Why did OM throw so much time and effort into the jamboree? According to Street, the project was almost a must. "Our plant is located miles away from any large entertainment centers," he points out, "and we must encourage any program that can give our people a sense of participation in community activities and at the same time allow the community to get a good impression of us."

All in all, the Labor Day weekend jamboree provided an excellent chance for OM to throw its resources into community welfare. For a cost of under $5,000, including the time of employees spent in preparing the show, the firm's generous participation, though achieved without fanfare, brought a big sense of well-being to several thousand people who every day, by their attitudes, have a chance to add to or detract from the reputation of Olin Mathieson.

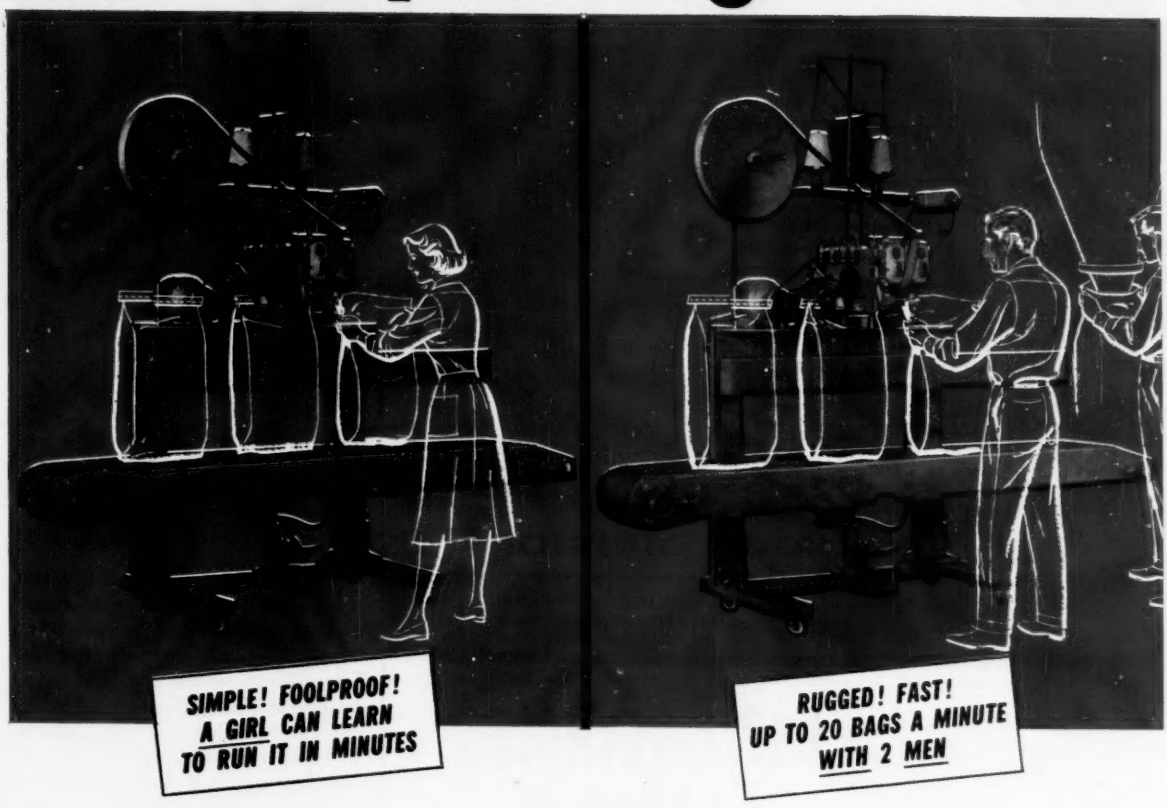


Crowd watches Parsons, Smathers, Booker exhibition.

Street, Booker, Thomas, Jackson, DeVania at final committee planning session before jamboree.



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WIDE WORLD

Governor Long: He predicts gas industry won't oppose new tax.

Gas Law Fight Rages On

Recent developments indicate that October may be a landmark month in the spirited controversy over state-federal lines of authority for the regulation of natural gas production and distribution.

A key case that may well redefine the Texas Railroad Commission's regulatory power over natural gas production is expected to be decided by the U. S. Supreme Court during its upcoming session which begins next month.

Texas state courts upheld the state commission's authority to require Permian Basin Pipe Line Co. to buy and process gas from all wells in the Puckett-Ellenberger field in Pecos County (*CW, Nov. 2, '57, p. 46*). Permian Basin attorneys in their Supreme Court appeal contended that the commission's order conflicted with the federal Natural Gas Act.

Commission Power Threatened: "If Permian Basin's charge is upheld," said Austin attorney Robert McGinnis, "the [Texas] commission will be stripped of much of its power to prorate and regulate the natural gas industry in Texas to prevent waste and protect correlative rights."

Predicting another development that would further muddy the waters, McGinnis recently told a group of Texas gas and oil law specialists that he foresees a conflict between state and federal regulatory agencies over price

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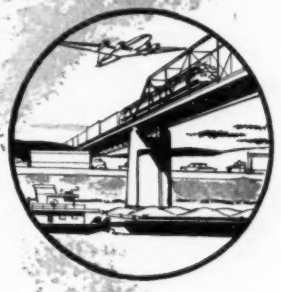




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- *Condition the community for industry acceptance*
- *Furnish complete information on rail, air, highway and water transportation.*





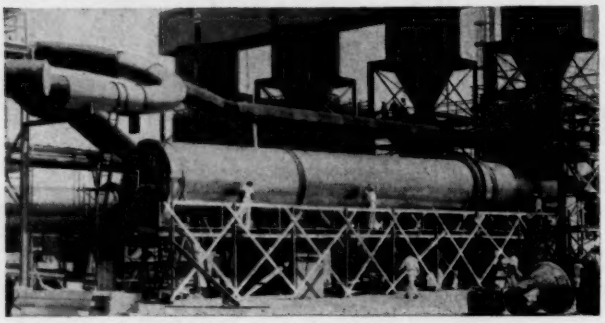
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ADMINISTRATION

control of gas at the well. Neither faction exercises this control at present, he said, and prices producers charge vary widely, depending upon the particular contract involved.

Louisiana Tax Hike: In Louisiana, Governor Earl Long has predicted that the natural gas industry would not challenge the constitutionality of that state's higher gas-gathering tax enacted by the '58 legislature.

If the revenues are tied up by a court order, Long has warned, the legislature would convene and put the tax on at the wellhead at "about twice what it now is." Industry sources have indicated that they feel a court test might knock out the existing levy as well as any new tax.

The legislature doubled the 1¢/1,000 cu. ft. tax and dedicated the estimated $20 million in new annual revenue to increasing the pay of school teachers in the state.

Long said he understood that Texas planned to increase its gas-gathering tax to match that of Louisiana.

Rate Hearing Recessed: Mississippi's Public Service Commission hearing on a $1.8 million United Gas Corp. rate increase has been recessed until Oct. 7 to permit investigation of the old and new rate schedules.

United boosted its rates 30% in 65 municipalities Aug. 1 and posted bond to cover the raise. The hearing was ordered to determine whether the increase should be permitted.

Appeals against the rate hike based on testimony taken in commission hearings will be made to Hinds County chancery court and the Mississippi state supreme court.

LEGAL

Secret Trials: A U. S. court of appeals decision has given an assist to inventors seeking to sue the federal government over matters connected with national security. The court ruled that Dr. Otto Halpern, inventor of a radar-evasion device, could sue for adequate compensation for his classified machine. A lower court had ruled that he could not bring suit until his invention had been declassified, but the appeals court opinion, written by Judge Sterry R. Waterman, says that "Congress must have foreseen that a public trial was an impossibility . . . [and that it] implicitly empowered the district



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1. What Polyol, first isolated more than 100 years ago from natural oils and fats, is now produced synthetically with extremely high purity?

* * * *

2. What two well-known Polyols are produced from propylene, caustic soda, and chlorine?

* * * *

3. Thanks largely to new synthetic production, what Polyol that sold for 55¢ per lb. in 1951 is now selling for approximately half that price?

* * * *

4. What commonly known Polyol had a big year in 1957 in the United States . . . with production of some 1,050,000,000 lbs. synthetically?

5. What important raw material comprises about 70% of the urethane flexible foams?

* * * *

6. What promising new Polyol, a reaction product of glycerine and propylene oxide, is proving useful as a plasticizer, alkyd resin intermediate, and urethane crosslinking agent?

* * * *

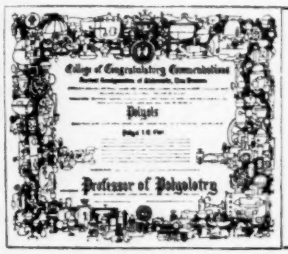
7. What outstanding advantage has caused the urethane industry to welcome Dow resin grade polyglycols enthusiastically?

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8. Why are polyglycols rapidly gaining favor over polyesters for the production of urethane polymers?

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We hope this quiz whets your appetite to know more about Polyols. Many brochures, technical papers and bulletins, including Dow's new folder, "World's Widest Line of Polyols", are available from your nearest Dow sales office. Or, write THE DOW CHEMICAL COMPANY, Midland, Michigan, Department GD 953A.



ANSWERS:

1) Glycerine. 2) Propylene glycol and glycerine. 3) Glycerine. 4) Ethylene glycol. 5) Resin grade polyglycols. 6) Hyprin® GP25. 7) Consistent reaction rates. 8) Polyglycols, at approximately half the price of polyesters, offer greatly reduced costs in final products.

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ADMINISTRATION

court to tailor the procedure within reasonable limits to meet individual situations."

•

"Unfair" Defined: A new addition has been added to the definitions of unfair competition—color copying. A United States district court has granted an injunction to Norwich Pharmacal Co. restraining Sterling Drug from reproducing the pink color of Norwich's Pepto-Bismol in Sterling's similar product, Pepsamar. If the company will not give up its color practice, the court ruled, it must then sell the product in a package that hides the color.

•

Copy of Cosmetics? Juliette Marglen, a cosmetics-producing subsidiary of Faberge, Inc., has filed suit in federal district court in New York charging that Revlon, Inc., is copying cosmetics owned by Faberge.

The suit charges that in 1956 negotiations were under way for Revlon to acquire Faberge and Marglen, but they fell through after Marglen had revealed all its plans for the coming year to Revlon. Marglen claims Revlon is now merchandising products copied from Marglen. The company seeks triple damages.

LABOR

Stauffer Contract: A one-year contract has been signed by Stauffer Chemical Co. and Local 13-163, District 50, United Mine Workers. The contract expires Aug. 18, '59.

Under provisions of the contract, 221 production and maintenance employees receive a 9¢/hour raise, an increase of 1¢/hour in differential pay, two extra paid holidays and a change in employee insurance coverage.

In addition, according to the union's regional director, Peter Vaccarella, the company increased its workclothes bonus and offered to pay $1.50 toward the purchase price of every pair of workshoes. Stauffer's pension plan remained unchanged.

•

Hollingshead Strike Ends: A strike of machinists at R. M. Hollingshead Corp. (Camden, N.J.) has ended with the negotiation of a new contract.

Eighteen machinists—members of Local 159, International Assn. of Machinists (independent) — receive a 10¢/hour wage boost now and an 8¢/hour hike in six months.

The plant closed July 30 after some 450 workers belonging to chemical and printing unions refused to cross the machinists' picket lines.

•

Certification Renewed: Employees of Spencer Chemical Co.'s plant at Henderson, Ky., have voted, 118-44, to continue bargaining under the aegis of International Chemical Workers Union. A petition from 30% of the employees had requested the National Labor Relations Board to supervise a vote to determine who would represent them.

KEY CHANGES

Howard J. Grady to executive vice-president and director, and **Otto R. Vasak** to South Plainfield, N.J., plant manager, California Spray-Chemical Corp. (Richmond, Calif.).

G. B. Carpenter to director of development for the Chemical Division, Air Reduction Chemical Co., division of Air Reduction Co. (New York).

T. W. DeWitt to director of basic research, **C. J. Stehman** to director of exploratory research and **A. B. Craig** to director of products research, all of Chemstrand Corp. (Decatur, Ala.).

Rolland O. Baum to president, Tennessee Products and Chemical Corp. (Nashville), subsidiary of Merritt-Chapman & Scott Corp.

Ramsey C. Armstrong to board chairman, Sierracin Corp. (Burbank, Calif.), producer of transparent plastic and glass laminates.

Don Hamilton to vice-president and sales manager, Norex Laboratories (New York), affiliate of Schenley Industries.

George I. Rounds to vice-president in charge of marketing, Industrial Rayon Corp. (Cleveland, O.).

Oscar John Dorwin to senior vice-president, **Marion J. Epley, Jr.,** and **Kerryn King** to vice-presidents, The Texas Co. (New York).

John R. McCord to marketing director, Ferro Corp. (Cleveland, O.).

John T. Toohy to chief operating executive, Squibb Division, Olin Mathieson Chemical Corp.

CHEMICALS OUTLOOK

September, 1958

This news bulletin about Wyandotte Chemicals services, products, and their applications, is published to help keep you posted. Perhaps you will want to route these and subsequent facts to interested members of your organization. Additional information and trial quantities of Wyandotte products are available upon request . . . may we serve you?

PLURACOL E NOW AVAILABLE IN A COMPLETE SERIES

The Pluracol* E series of Wyandotte's polyethylene glycols is now offered in four liquid and six solid grades, ranging in molecular weight from 200 to 6,000. The Pluracol polyglycols are available in 5 and 55 gal. drums as well as tank-car quantities.

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Wyandotte has extensive background and experience in oxide chemistry, including development of Pluronic* and Tetronic* polyols. The Pluracol series is another step in Wyandotte's planned program of broadening its line of products in the ethylene oxide derivative field. Data sheets are available on both liquid and solid polyethylene glycol grades (Pluracol E) by writing us direct care of Dept. CO.

On the horizon . . . a complete series of liquid polypropylene glycols will soon be marketed under the trademark Pluracol P.

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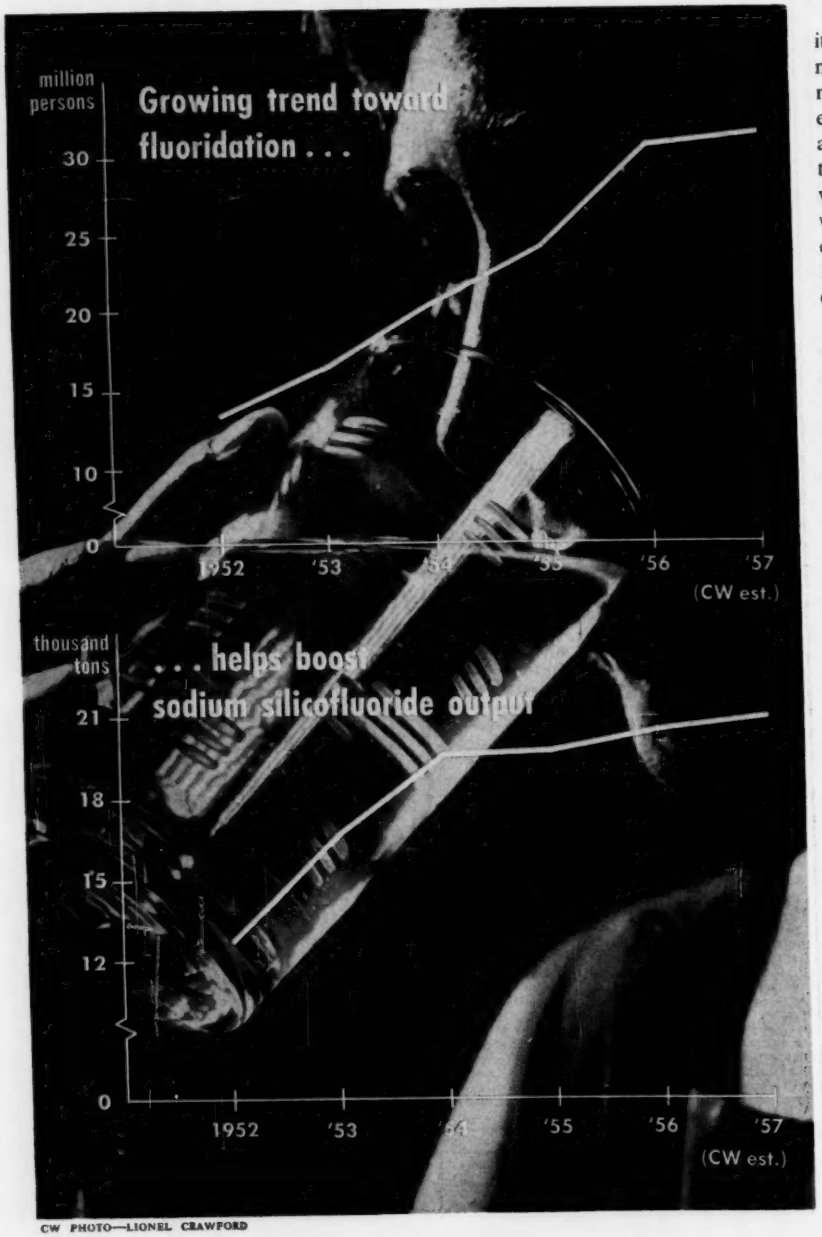
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Fluoride Makers Toast Water Treatment



CW PHOTO—LIONEL CRAWFORD

Despite some extreme opposition to it, fluoridation is becoming part of the municipal water-treating process of more and more communities. By the end of this year, some 1,650 towns and cities, with population of more than 34 million people, will be provided with fluoride-treated drinking water. Just eight years ago, only 94 communities, with population of just 1.5 million people, had fluoridated drinking water.

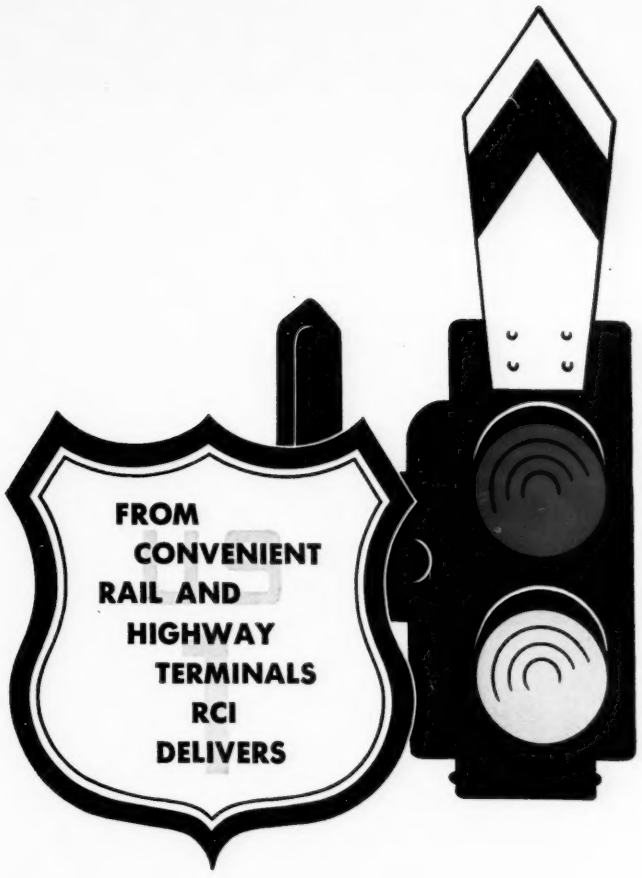
Some of the big cities now fluoridating include Washington, D. C., St. Louis, Philadelphia, Baltimore. New York city has so far resisted the trend toward fluoridation. Should it choose to try it, the number of U. S. fluoride users would be increased almost one-third.

More widespread fluoridation has given a significant spurt to output of fluoride chemicals, most important of which is sodium silicofluoride. By the end of '58, output of this fluoride is expected to pass 21,000 tons, a near-40% hike over '52's 12,700-ton output. About 8,000 tons, 38% of this year's production, will go into fluoridation of municipal water supplies.

Other important fluoridation chemicals consumed this year include:

Fluosilicic acid (25%), 8,000 tons; sodium fluoride, 1,600 tons; miscellaneous fluorides, 150 tons.

One community is now using a new method of fluoridation developed by U.S. Public Health Service. It involves the use of fluorspar directly, instead of converting the fluorspar into a fluorine compound. One other community is now installing this type of fluoridation process. Big advantage is, of course, economy—and proponents of fluoridation favor any of the proved systems used in adding the chemical.



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